RTI Queuing Service

Getting Started Guide

Version 6.0.1
Trademarks
RTI, Real-Time Innovations, Connext, NDDS, the RTI logo, 1RTI and the phrase, “Your Systems. Working as one,” are registered trademarks, trademarks or service marks of Real-Time Innovations, Inc. All other trademarks belong to their respective owners.

Copy and Use Restrictions
No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form (including electronic, mechanical, photocopy, and facsimile) without the prior written permission of Real-Time Innovations, Inc. The software described in this document is furnished under and subject to the RTI software license agreement. The software may be used or copied only under the terms of the license agreement.

This is an independent publication and is neither affiliated with, nor authorized, sponsored, or approved by, Microsoft Corporation.

The security features of this product include software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/).

Technical Support
Real-Time Innovations, Inc.
232 E. Java Drive
Sunnyvale, CA 94089
Phone: (408) 990-7444
Email: support@rti.com
Website: https://support.rti.com/
Contents

Chapter 1 Welcome to RTI Queuing Service
  1.1 Paths Mentioned in Documentation ................................................................. 1

Chapter 2 Installing Queuing Service
  2.1 Installing on a UNIX-Based System ................................................................. 3
  2.2 Installing on a Windows System ....................................................................... 4

Chapter 3 Using the Examples .................................................................................. 5

Chapter 4 Running Queuing Service
  4.1 Starting from Launcher ....................................................................................... 6
  4.2 Starting Manually from the Command Line ....................................................... 7
  4.3 Using Queuing Service as a Windows Service .................................................... 9
    4.3.1 Enabling Queuing Service to Run as a Windows Service ............................... 9
    4.3.2 Running RTI Queuing Service as a Windows Service .................................. 10
    4.3.3 Notes when Running as a Windows Service ................................................. 10
    4.3.4 Stopping Queuing Service when it is Running as a Windows Service ........... 11
    4.3.5 Disabling Queuing Service from Running as a Windows Service ................ 11
Chapter 1 Welcome to RTI Queuing Service

RTI® Queuing Service is a broker that provides a queuing communication model in which a sample is stored in a queue until it is consumed by one QueueConsumer. If there are no QueueConsumers available when the sample is sent, the sample is kept in the queue until a QueueConsumer is available to process it. If a QueueConsumer receives a sample and does not acknowledge it before a specified amount of time or acknowledges it negatively, the sample will be redelivered to a different QueueConsumer.

Queuing Service provides an “at-most-once” and “at-least once” delivery semantic.

By default, Queuing Service keeps the samples in memory. To provide fault tolerance, Queuing Service can be configured to keep the samples on disk.

For high availability, Queuing Service provides mechanisms to replicate its state so that samples can survive the loss of any particular service and/or computer.

1.1 Paths Mentioned in Documentation

The documentation refers to:

- `<NDDSHOME>`

  This refers to the installation directory for RTI® Connext® DDS. The default installation paths are:
  - macOS® systems:
    `/Applications/rti_connext_dds-6.0.1`
  - UNIX-based systems, non-root user:
    `/home/<your user name>/rti_connext_dds-6.0.1`
  - UNIX-based systems, root user:
    `/opt/rti_connext_dds-6.0.1`
1.1 Paths Mentioned in Documentation

- Windows® systems, user without Administrator privileges:
  \texttt{<your home directory>\rti\_connext\_dds-6.0.1}

- Windows systems, user with Administrator privileges:
  \texttt{C:\Program Files\rti\_connext\_dds-6.0.1}

You may also see \texttt{NDDSHOME} or \texttt{%NDDSHOME%}, which refers to an environment variable set to the installation path.

Wherever you see \texttt{<NDDSHOME>} used in a path, replace it with your installation path.

\textbf{Note for Windows Users:} When using a command prompt to enter a command that includes the path \texttt{C:\Program Files} (or any directory name that has a space), enclose the path in quotation marks. For example:

```
"C:\Program Files\rti\_connext\_dds-6.0.1\bin\rtiddsgen"
```

Or if you have defined the \texttt{NDDSHOME} environment variable:

```
"%NDDSHOME%\bin\rtiddsgen"
```

- \texttt{<path to examples>}

By default, examples are copied into your home directory the first time you run \textit{RTI Launcher} or any script in \texttt{<NDDSHOME>/bin}. This document refers to the location of the copied examples as \texttt{<path to examples>}. Wherever you see \texttt{<path to examples>}, replace it with the appropriate path.

Default path to the examples:

- macOS systems: \texttt{/Users/<your user name>/rti\_workspace/6.0.1/examples}
- UNIX-based systems: \texttt{/home/<your user name>/rti\_workspace/6.0.1/examples}
- Windows systems: \texttt{<your Windows documents folder>/rti\_workspace/6.0.1/examples}

  Where 'your Windows documents folder' depends on your version of Windows. For example, on Windows 10, the folder is \texttt{C:\Users\<your user name>\Documents}.

Note: You can specify a different location for \texttt{rti\_workspace}. You can also specify that you do not want the examples copied to the workspace. For details, see \textit{Controlling Location for RTI Workspace and Copying of Examples} in the \textit{RTI Connext DDS Installation Guide}. 
Chapter 2 Installing Queuing Service

This chapter describes:

- 2.1 Installing on a UNIX-Based System below
- 2.2 Installing on a Windows System on the next page

2.1 Installing on a UNIX-Based System

Install Queuing Service on top of Connext DDS. There are two ways to install it, from RTI Launcher or from the command line.

From RTI Launcher:

1. Start RTI Launcher from the command line:

```
cd <NDDSHOME>/bin
./rti launcher
```

<NDDSHOME> is described in 1.1 Paths Mentioned in Documentation on page 1.

2. From the Configuration tab, select Install RTI Packages.

3. In the resulting dialog, use the + sign to add the .rtipkg file that you want to install.

4. Click Install.

From the command line:

```
cd <NDDSHOME>/bin
./rtipkg install <path to .rtipkg file>
```

If you want to install Queuing Service without user interaction (unattended mode), use the -u flag when installing from the command line:

```
cd <NDDSHOME>/bin
./rtipkg install -u <path to .rtipkg file>
```
**2.2 Installing on a Windows System**

*Queuing Service* will be installed in the `<NDDSHOME>` directory (see 1.1 Paths Mentioned in Documentation on page 1).

Install *Queuing Service* on top of *Connext DDS*. There are two ways to install it, from *RTI Launcher* or from the command line.

**From RTI Launcher:**

1. Start *RTI Launcher* from the Start menu or the command line:

   ```
   cd <NDDSHOME>\bin
   rtilauncher
   ```
   `<NDDSHOME>` is described in 1.1 Paths Mentioned in Documentation on page 1.
2. From the Configuration tab, select Install RTI Packages.
3. In the resulting dialog, use the + sign to add the `.rtipkg` file that you want to install.
4. Click Install.

**From the command line:**

```
cd <NDDSHOME>\bin
rtipkginstall <path to .rtipkg file>
```

If you want to install *Queuing Service* without user interaction (unattended mode), use the `-u` flag when installing from the command line:

```
cd <NDDSHOME>/bin
./rtipkginstall -u <path to .rtipkg file>
```

*Queuing Service* will be installed in the `<NDDSHOME>` directory (see 1.1 Paths Mentioned in Documentation on page 1).
Chapter 3 Using the Examples

Queuing Service includes two examples to show its most relevant functionality:

- **hello_world**: A Hello World application, in which is shown how to send/receive samples from/to Queuing Service. The example also shows how to use other relevant features such as persistence and replication.

- **remote_config**: A Remote Configuration example, in which is shown how to remotely create/delete resources, query their status, get a message, or flushing SharedReaderQueues. This example uses the Request/Reply API.

The examples are in `<path to examples>/queuing_service/<language>`, where `<path to examples>` is described in 1.1 Paths Mentioned in Documentation on page 1 and `<language>` is c++ for C++ or cs for .NET. There are some differences between the versions:

- The .NET **hello_world** example uses the Queuing Service wrapper API, while the C++ example uses DataWriters and DataReaders directly to interact with Queuing Service, since the wrapper API is not available for C++.

- The .NET **hello_world** example uses two SharedReaderQueues: a request and a reply SharedReaderQueue. The C++ example only uses a request SharedReaderQueue.

- The .NET **hello_world** example is also a performance test, measuring requests and replies per second, The C++ version sends one message per second.

By default, the .NET **hello_world** example’s SharedReaderQueues use different types than the C++ example.

Because of these differences, you will need to make some modifications in the examples in order for a **hello_world** C++ Producer to interoperate with a **hello_world** .NET Replier, and vice-versa.

To run the examples, please follow the instructions in the README.txt file included in the example’s directory.
Chapter 4 Running Queuing Service

Queuing Service runs as a separate application. The script to run the executable is in `<NDDSHOME>/bin`. There are four ways to start Queuing Service:

- 4.1 Starting from Launcher below
- 4.2 Starting Manually from the Command Line on the next page
- 4.3 Using Queuing Service as a Windows Service on page 9

If you are starting Queuing Service as a Windows Service, also read 4.3.3 Notes when Running as a Windows Service on page 10.

4.1 Starting from Launcher

1. Start RTI Launcher from the Start menu (on Windows systems) or on the command line, type:

```
<NDDSHOME>/bin/rtilauncher
```
2. From the Services tab, select Queuing Service.

![RTI Connect Launcher Services tab](image)

### 4.2 Starting Manually from the Command Line

To start Queuing Service, enter:

```
cd <NDDSHOME>
bin/rtiqueuingservice [options]
```

**Example:**

```
cd <NDDSHOME>
bin/rtiqueuingservice -cfgFile example.xml -cfgName QueuingService_1
```

Table 4.1 RTI Queuing Service Command-Line Options describes the command-line options.

**Table 4.1 RTI Queuing Service Command-Line Options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-appName &lt;name&gt;</td>
<td>Assigns a name to the execution of Queuing Service. Remote commands will refer to the queuing service using this name. In addition, the name of DomainParticipants created by Queuing Service will be based on this name. Default: The name given with -cfgName, if present, otherwise it is RTI_Queuing_Service.</td>
</tr>
</tbody>
</table>
## Table 4.1 RTI Queuing Service Command-Line Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-cfgFile &lt;name&gt;</td>
<td>Specifies a configuration file to be loaded. This parameter is required. See Section 3.1 How to Load the XML Configuration from a File in the Queuing Service User's Manual.</td>
</tr>
<tr>
<td>-cfgName &lt;name&gt;</td>
<td>Specifies a configuration name. Queuing Service will look for a matching <code>&lt;queuing_service&gt;</code> tag in the configuration file. This parameter is required unless -cfgRemote is used.</td>
</tr>
<tr>
<td>-cfgRemote</td>
<td>Specifies that the initial configuration of the service must be obtained remotely from other running instances. Using this option also requires the use of <code>-remoteAdministrationDomainId</code> to enable remote administration, because the initial configuration will be received in the remote administration domain ID. If you use this option and -cfgName, the service will wait until a configuration with that name is received. Otherwise, the service will use the first configuration that it receives. If the service does not receive the initial configuration after a configurable timeout (see -cfgRemoteTimeout), it will load the configuration from the input configuration file(s).</td>
</tr>
<tr>
<td>-cfgRemoteTimeout &lt;tp&gt;</td>
<td>Specifies the maximum amount of time, in seconds, that Queuing Service will wait for an initial configuration when using -cfgRemote. Default: 20 seconds</td>
</tr>
<tr>
<td>-daemon</td>
<td>Runs Queuing Service as a daemon/Windows service. When this flag is present, Queuing Service will start in the background. Note that some systems may require special privileges to do this.</td>
</tr>
<tr>
<td>-domainIdBase &lt;ID&gt;</td>
<td>Sets the base domain ID. This value is added to the domain IDs in the configuration file. For example, if you set -domainIdBase to 50 and use domainIDs 0 and 1 in the configuration file, then Queuing Service will use domains 50 and 51. Default: 0</td>
</tr>
<tr>
<td>-heapSnapshotPeriod</td>
<td>Enables heap monitoring. Queuing Service will generate a heap snapshot every &lt;sec&gt;. Default: heap monitoring is disabled.</td>
</tr>
<tr>
<td>-heapSnapshotDir</td>
<td>When heap monitoring is enabled, this parameter configures the directory where the snapshots will be stored. The snapshot filename format is RTI_&lt;configurationName&gt;&lt;processId&gt;&lt;index&gt;.log. Default: current working directory</td>
</tr>
<tr>
<td>-help</td>
<td>Displays help information.</td>
</tr>
<tr>
<td>-remoteAdministrationDomainId &lt;ID&gt;</td>
<td>Enables remote administration and sets the domain ID for remote communication. When remote administration is enabled, Queuing Service will create a DomainParticipant, Publisher, Subscriber, DataWriter, and DataReader in the designated domain. See Chapter 5, Administering Queuing Service from a Remote Location, in the Queuing Service User's Manual. This option overrides the value of the tag <code>&lt;domain_id&gt;</code> within a <code>&lt;administration&gt;</code> tag. This parameter is required when using -cfgRemote. Default: Remote administration is not enabled unless it is enabled from the XML file.</td>
</tr>
</tbody>
</table>
Table 4.1 RTI Queuing Service Command-Line Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-persistentFilePrefix</td>
<td>Specifies a name prefix to use with all files created by Queuing Service.</td>
</tr>
<tr>
<td></td>
<td>This option overrides the value of the tag <code>&lt;file_prefix&gt;</code> within <code>&lt;persistence_settings&gt;/filesystem</code>.</td>
</tr>
<tr>
<td></td>
<td>Default: Value in <code>&lt;persistence_settings&gt;/filesystem/&lt;file_prefix&gt;</code>.</td>
</tr>
<tr>
<td>-persistentStoragePath</td>
<td>Configures the directory for persistent storage.</td>
</tr>
<tr>
<td></td>
<td>This option overrides the value of the tag <code>&lt;directory&gt;</code> within <code>&lt;persistence_settings&gt;/filesystem</code>.</td>
</tr>
<tr>
<td></td>
<td>Default: Value in <code>&lt;persistence_settings&gt;/filesystem/&lt;directory&gt;</code>.</td>
</tr>
<tr>
<td>-var &lt;name&gt;=&lt;value&gt;</td>
<td>Sets the value of the variable <code>&lt;name&gt;</code>. This variable can be referenced</td>
</tr>
<tr>
<td></td>
<td>within the XML configuration files using the ${&lt;name&gt;)} notation. See</td>
</tr>
<tr>
<td></td>
<td>Section 3.4, Using Variables in XML, in the Queuing Service User's Manual</td>
</tr>
<tr>
<td></td>
<td>for more information on configuration variables.</td>
</tr>
<tr>
<td></td>
<td>You may have more than one -var flag on the command line.</td>
</tr>
<tr>
<td></td>
<td>On Windows platforms, you will need to put quotation marks around the</td>
</tr>
<tr>
<td></td>
<td>variable name and value, like this:</td>
</tr>
<tr>
<td></td>
<td>-var &quot;MY_VAR=myvalue&quot;</td>
</tr>
<tr>
<td>-verbosity &lt;n&gt;</td>
<td>Controls what type of messages are logged:</td>
</tr>
<tr>
<td></td>
<td>0 - Silent</td>
</tr>
<tr>
<td></td>
<td>1 - Exceptions (Connext DDS and Queuing Service) (default)</td>
</tr>
<tr>
<td></td>
<td>2 - Warnings (Queuing Service)</td>
</tr>
<tr>
<td></td>
<td>3 - Information (Queuing Service)</td>
</tr>
<tr>
<td></td>
<td>4 - Warnings (Connext DDS and Queuing Service)</td>
</tr>
<tr>
<td></td>
<td>5 - Tracing (Queuing Service)</td>
</tr>
<tr>
<td></td>
<td>6 - Tracing (Connext DDS and Queuing Service)</td>
</tr>
<tr>
<td></td>
<td>Each verbosity level, &lt;n&gt;, includes all the verbosity levels smaller than &lt;n&gt;.</td>
</tr>
<tr>
<td>-version</td>
<td>Prints the Queuing Service version number.</td>
</tr>
</tbody>
</table>

4.3 Using Queuing Service as a Windows Service

Windows Services automatically run in the background when the system reboots.

4.3.1 Enabling Queuing Service to Run as a Windows Service

If you want to run Queuing Service as a Windows Service, you must install it as such before running it. To install it as a Windows Service, run the following command in a terminal with Administrator privileges:

```
<NDDSHOME>/bin/rtiqueuingservice -installService
```

By default, Queuing Service is installed with the service name `rtiqueuingservice523`. If you want to install it with a different service name, you can use the `-serviceName` flag. For instance (you would enter this all on one line):

```
<NDDSHOME>/bin/rtiqueuingservice -serviceName MyServiceName
```
4.3.2 Running RTI Queuing Service as a Windows Service

If you added Queuing Service as a Windows Service and want to run it without rebooting, you can start it as a service from the command line with the Windows `sc` utility:

```
sc <serviceName> start
```

By default, it will start Queuing Service with the "defaultService" configuration that is stored in `<NDDSHOME>\resource\xml\RTI_QUEUEING_SERVICE.xml`. This configuration contains a service running with an empty SharedSubscriber with remote administration and monitoring enabled.

If you want to start Queuing Service with different parameters, you can use the utility `nssm`. You can specify the parameters from the command line by setting the option AppParameters. For example (you would enter this all on one line):

```
%NDDSHOME%\resource\app\bin\x64Win64VS2008\nssm.exe set <serviceName> AppParameters "<queuing service arguments>"
```

For more information and examples, see 4.3.3 Notes when Running as a Windows Service below.

Additionally, you can start Queuing Service from the Windows Services Control Manager. From the Start Menu, select Control Panel, Administrative Services, Services. Click on the service in the list, then right-click to select Start.

4.3.3 Notes when Running as a Windows Service

Here are some things to consider when running Queuing Service as a Windows Service:

- All AppParameters arguments must be enclosed in quotation marks.
- To refer to variables in the XML configuration file, use the Queuing Service command-line option -var to set the variable’s value. The syntax for referring to a variable in the XML file is:
  ```
  <name>$(NAME)</name>
  ```
- For the AppParameters passed to nssm, use -var like this:
  ```
  -var MY_DOMAIN=10
  ```

For example (you would enter this all on one line):

```
%NDDSHOME%\resource\app\bin\x64Win64VS2008\nssm.exe set rtiqueuingservice523 AppParameters
"-cfgFile \"C:\dir with spaces\qsconf-with-vars.xml\"
 -cfgName MyCustomConf -var MY_DOMAIN=10"
```
4.3.4 Stopping Queuing Service when it is Running as a Windows Service

- If a variable value includes spaces, you must enclose the value in escaped quotes. For example (you would enter this all on one line):

```
%NDDSHOME%\resource\app\bin\x64Win64VS2008\nssm.exe
set rtiqueuingservice523 AppParameters
"-cfgFile \"C:\dir with spaces\qsconf-with-vars.xml\"
-cfgName MyCustomConf -var \"NAME=My QS name\"
```

- If you use environment variables instead of the -var command-line option, you may need to restart your Windows machine.

- If you specify -cfgFile in the Start Parameters field, you must use the full path to the file.

- Some versions of Windows do not allow Windows Services to communicate with other services/applications using shared memory. For this reason, if you plan to run Queuing Service as Windows Service, you should disable the shared-memory transport in all the DomainParticipants created by Queuing Service and in the applications communicating with Queuing Service. For more information on setting builtin transports, see the RTI Connext DDS Core Libraries User's Manual (see the section, "Builtin Transport Plugins").

- In some scenarios, you may need to add a multicast address (e.g., builtin.udpv4://239.255.0.1) to your discovery peers. For details on setting the discovery peers, see the RTI Connext DDS Core Libraries Getting Started Guide (see the section, "How to Set Your Discovery Peers").

4.3.4 Stopping Queuing Service when it is Running as a Windows Service

To stop Queuing Service when it is running as a Windows Service, use this command:

```
sctriqueuingservice523 stop
```

You can also start/stop Queuing Service from the Windows Services Control Manager. From the Start menu, select Control Panel, Administrative Services, Services. Click on the service in the list, then right-click to select Start or Stop.

4.3.5 Disabling Queuing Service from Running as a Windows Service

To remove Queuing Service from the list of Windows Services on your system, run this command in a terminal with Administrator privileges:

```
<NDDSHOME>\bin\rtiqueuingservice -uninstallService
```

By default, the service rtiqueuingservice523 is uninstalled. If you want to uninstall a different service instance, add the -serviceName option to the above command.