

# RTI Connex Messaging

## Getting Started Guide

Version 4.5



Your systems. Working as one.



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## Chapter 1 Welcome to RTI Connexx Messaging

*Connexx Messaging* provides a versatile and highly scalable messaging middleware for developing applications leveraging a variety of embedded and enterprise design patterns. *Connexx Messaging's* flexibility reduces development, integration, and testing costs and enables rapid implementation of new system requirements. Features include:

- ❑ APIs for JMS and *Connexx* DDS
- ❑ Support for *Persistence Service* for late joiners and *Recording Service* for logging data for deep analysis and archiving
- ❑ *Federation Service* securely bridges applications and systems across both local and wide area networks
- ❑ Tools to monitor, analyze and debug your complete system
- ❑ Seamless interoperability with *Connexx* Micro and *Connexx* DDS

With its rich set of tools and its performance and scalability extensions, *Connexx Messaging* provides much more than a traditional messaging system. It offers capabilities to visualize your data as it moves through your system—even in real-time—allowing you to monitor, analyze and debug your complete system in operation. It provides facilities for persisting data for late joiners, and logging data for deeper analysis and archiving. It also features adapters for DDS and JMS, and superior performance and scalability.

The entire *Connexx* family of products is based on RTI's ultra high-performance Data-bus™ that delivers throughput up to millions of messages per second. It can deliver in excess of 50 times the performance of non-real-time standards such as JMS, AMQP and Web Services. Additionally, it consistently provides low latency on the order of micro-seconds.



## Chapter 2 Installation

RTI® *Connex*<sup>TM</sup> *Messaging* includes these components:

- ❑ **RTI Connex Launcher** is a graphical application that allows you to run and configure any *Connex Messaging* component. It automatically detects which *Connex Messaging* components are installed and enables their launch buttons.
- ❑ **RTI Connex Core Libraries and Utilities** provide publish/subscribe networking middleware for a wide variety of processors and operating systems. The *Connex Core Libraries and Utilities* are delivered as linkable binary libraries (target libraries) with development tools and documentation that aid in the use of the libraries.
- ❑ **RTI TLS Support<sup>1</sup>** provides secure communication over the Internet using the standard Transport Layer Security (TLS) protocol. The transport allows applications to communicate in a way that is designed to prevent eavesdropping, tampering, or data forgery. *TLS Support* is designed for use with the TCP transport that is included with *Connex*.
- ❑ **RTI Secure WAN Transport<sup>1</sup>**, like the TLS Transport, provides secure communication over the Internet. Instead of TLS it uses the Datagram Transport Layer Security (DTLS) protocol, which can be run over UDP.
- ❑ **RTI Message Service** is publish/subscribe networking middleware that implements the Java Message Service (JMS) specification. *Message Service* is specifically designed for high-performance distributed applications. Its unique peer-to-peer architecture and targeted high-performance and real-time capabilities extend the specification to provide unmatched value.

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1. Available for download in a separate distribution; not included with the *Connex Messaging* installer.

- ❑ **RTI Distributed Logger** is a library that enables applications to publish their log messages to *Connex*. The log message data can be visualized with *RTI Monitor*, a separate GUI application that can run on the same host as your application or on a different host. Since the data is provided in a topic, you can also use *rtiddsspy* or even write your own visualization tool.
- ❑ **RTI Monitor** provides a detailed, graphical view into your entire *Connex* application. It displays the Quality of Service (QoS) parameters for every *Connex* entity in the system as well as detailed statistics on connections, traffic, errors, and resource usage. *RTI Monitor* simplifies troubleshooting and integration.
- ❑ **RTI Monitoring Library** is a plug-in that enables *Connex* applications to provide monitoring data to *Monitor*.
- ❑ **RTI Persistence Service** saves data from *Connex* publishing applications to memory or permanent storage, so it can be delivered to subscribing applications that join the system at a later time—even if the publishing application has already terminated. Data can be persisted to files or an external database.
- ❑ **RTI Recording Service** can record high-rate data arriving in real time with minimal impact on system behavior. It can reliably record large amounts of real-time data without having prior knowledge of the data-types or topics in the system. *Recording Service* is operating-system and programming-language agnostic, recording data from a heterogeneous networked system running *Connex*. You can also replay the recorded data by injecting it back into the data cloud. The replay feature even allows you to change data rates and QoS settings and provides fidelity to within 10 milliseconds of the recorded data rate.

The *Recording Console* provides a point-and-click interface for *Recording Service*. This interface significantly reduces *Recording Service* configuration time and complexity, and does not require any programming. The *Recording Console* makes it easy to use apply *Recording Service* for testing algorithms and other processing logic against pre-recorded test data, conducting regression testing from 'golden' data inputs, or recording live data from the field for post-mission analysis.
- ❑ **RTI Federation Service** is an out-of-the-box solution for integrating disparate and geographically dispersed systems. It scales *Connex* applications across domains, LANs and WANs, including firewall and NAT traversal.
- ❑ **RTI Analyzer** is a system-level debugging tool that can find *Connex* objects in a running system, organize them, and display their communication parameters.
- ❑ **RTI Spreadsheet Add-in for Microsoft Excel** integrates *Connex* with Microsoft® Excel®. By using cell functions, Excel can subscribe to topic data and display it in real-time. You can use this live data for formulas, graphs and other



Excel features, just like any other regular cell data. You can also publish data from a spreadsheet. *Spreadsheet Add-in for Microsoft Excel* works with all data types. (Available for Windows systems only.)

- ❑ **RTI Shapes Demo** is an application that illustrates the powerful real-time messaging and application integration capabilities of *Connex*, including data-centric publish/subscribe, real-time Quality of Service (QoS), fault tolerance and automatic discovery. *Shapes Demo* is a turnkey, graphical application and does not require any programming.
- ❑ **Wireshark** is a network-level analysis tool that can capture RTPS packets, show their contents, and analyze network usage. (Note: For Windows Systems, WinPcap is also included with this component.)

If you have questions, please email [support@rti.com](mailto:support@rti.com) or call (408) 990-7444.

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## 2.1 Before You Install

If you are about to install a version of *Connex Messaging* that is *not* license-managed, you must remove any previously installed versions of the same release that *are* license-managed.

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## 2.2 Installing on a Linux System

*Connex Messaging*'s components are provided in a single self-extracting file, one per architecture (except for *RTI TLS Support* and *RTI Secure WAN Transport*, which can be downloaded separately.) You do not need to be *root* to run the self-extracting file.

Throughout this document, we refer to 4.5*x*; the *x* represents the letter of the current release.

The installer will guide you through the installation process and allow you to specify an installation location (the default is your \$HOME directory)—the directory **RTI** will be added to the location you specify. This is *not* a GUI-based installer.

1. Run the self-extracting file for your architecture. For example:

```
./RTI_Connex_Messaging-4.5x-RHEL5_32_lic.sh
```

Assuming you have selected **/opt** as your installation directory, you will end up with the following components under **/opt/RTI** (the **RTI** directory is appended to your installation path automatically):

- **docs\_<version>/RTI\_Connext\_Messaging\_GettingStarted.pdf**  
— This document.
  - **installers\_<version>/Wireshark\_<version>** — This directory contains a compressed distribution (.tar.gz) file for *Wireshark* and the *RTI Wireshark Getting Started Guide*.
  - **ndds.<version>** — This directory includes *Connext Core Libraries and Utilities*, *Distributed Logger*, *Message Service*, *Monitoring Library*, and *Persistence Service*.
  - **RTI\_Analyzer\_<version>**
  - **RTI\_Federation\_Service\_<version>**
  - **RTI\_Launcher\_<version>**
  - **RTI\_Monitor\_<version>**
  - **RTI\_Recording\_Service\_<version>**
  - **rti\_set\_bash\_<version>** — You can run the “source” command with this filename to set some of the environment variables in bash.
  - **rti\_set\_tcsh\_<version>** — You can run the “source” command with this filename to set some of the environment variables in tcsh.
  - **RTI\_Shapes\_Demo\_<version>**
2. You will be asked if you want to open the *Getting Started Guide*. Enter either **y** (for yes) or **n** (for no). To view the *Getting Started Guide*, you must have an application capable of reading PDF documents, such as Evince.
  3. You will also be asked if you want to start *Launcher*. Enter either **y** (for yes) or **n** (for no). To run *Launcher*, you must be running a graphical environment (such as X11, GNOME or KDE). *Launcher* is described in [Chapter 3](#).
  4. Optionally, install *Wireshark*.  

Wireshark is not automatically installed because doing so requires root privilege. You will find its installer in the **installers\_<version>/Wireshark\_<version>** directory. See the installation instructions in **installers\_<version>/Wireshark\_<version>/RTI\_Wireshark\_GettingStarted.pdf**.
  5. Optionally, download and install *Secure WAN Transport* and *TLS Support*.  

You may download them from the RTI Support Portal: <https://support.rti.com/>. Enter your username and password, then select the Downloads tab.
  6. See [Installing the License File \(Section 2.4\)](#).

**After Installation:**

- ❑ See the documentation for each component. Each of the components you installed may have *Release Notes*, a *Getting Started Guide* or *Installation Guide*, and a *User's Manual*.

While you can skip the installation instructions in each component's *Getting Started Guide* or *Installation Guide*, please read the rest of the document. These documents may describe other required steps for setting up the components.

**One of the first documents to read is the *RTI Core Libraries and Utilities Getting Started Guide*: (<installation directory>/ndds.<version>/doc/pdf/RTI\_Connext\_GettingStarted.pdf).**

- ❑ *Launcher* provides a convenient way to run and configure all of your *Connext Messaging* components. See [Chapter 3: Using RTI Launcher](#).
- ❑ To build and run your first *Connext* application, see Chapter 3 in the *RTI Core Libraries and Utilities Getting Started Guide*.

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## 2.3 Installing on a Windows System

*Connext Messaging's* components are provided in a single self-extracting file, one per architecture (except for *TLS Support* and *Secure WAN Transport*, which can be downloaded separately.)

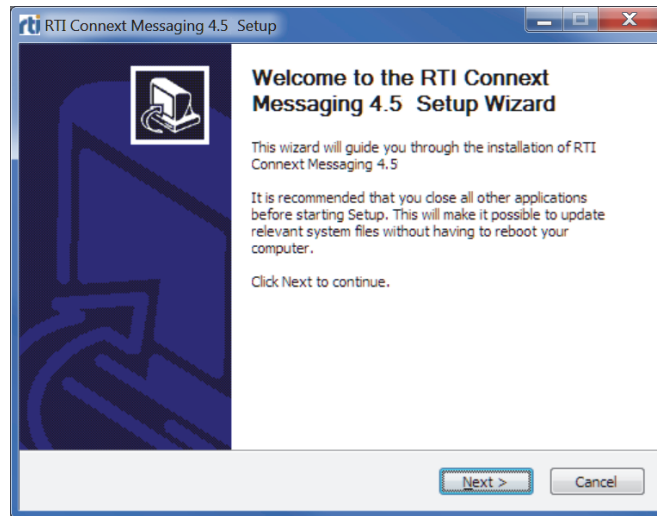
*Connext Messaging* is provided as an installer, one for 32-bit Windows architectures and another for 64-bit Windows architectures. You do not need to have administrator privilege to run the installer.

If you run the installer with administrator privilege, *Connext Messaging* will be installed for all users on the same machine.

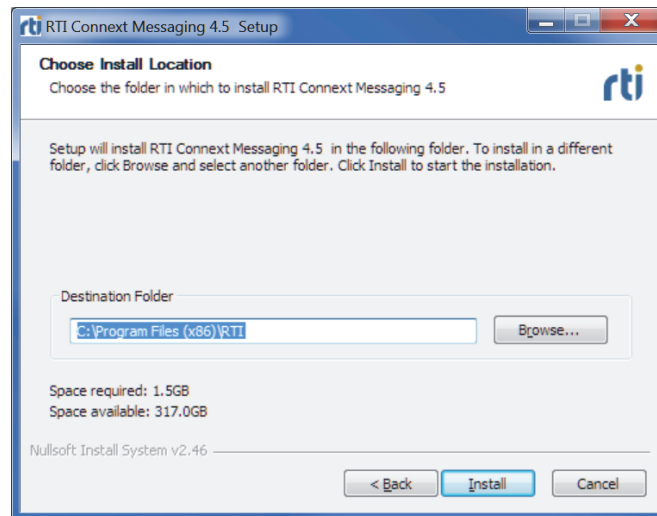
If you run the installer without administrator privilege, *Connext Messaging* will be installed for the current user only.

**Note:** If you need to install both the 32- and 64-bit versions on the same machine, see [Section 2.3.1](#) before continuing with the installation instructions below.

1. Open the .exe file to run the installer, which will guide you through the installation process and allow you to select an installation directory.



The default installation directory is **C:\Program Files\RTI** if you have administrator privilege, or **C:\Documents and Settings\*<user>*\My Documents\RTI** if you do not have administrator privilege.



You will end up with the following components in your installation directory:

- **docs <version>\RTI\_Connext\_Messaging\_GettingStarted.pdf**  
— This document.
  - **installers <version>**
    - **Microsoft Redist** — This directory contains installers for the Microsoft Visual C++ 2005 Service Pack 1 Redistributable Package MFC Security Update. You will need the x86 version if you plan to use *RTI Launcher*.
    - **RTI Spreadsheet Add-in for Microsoft Excel <version>** — This directory contains the installer for *RTI Spreadsheet Add-in for Microsoft Excel* and its *Getting Started Guide*.
    - **Wireshark <version>** — This directory contains the installer for *Wireshark* and its *Getting Started Guide*.
  - **ndds.<version>** — This directory includes *Connext Core Libraries and Utilities*, *Distributed Logger*, *Message Service*, *Monitoring Library*, and *Persistence Service*.
  - **RTI Analyzer <version>**
  - **RTI Recording Service <version>**
  - **RTI Shapes Demo <version>**
  - **RTI\_Federation\_Service <version>**
  - **RTI\_Launcher\_<version>**
  - **RTI\_Monitor\_<version>**
  - **rti\_set\_env\_<version>.bat** — You can use this batch file to set some of the environment variables.
  - **uninstall\_RTI\_Connext\_Messaging-<version>.exe**
2. Optionally, install *Spreadsheet Add-in for Microsoft Excel*:

*Spreadsheet Add-in for Microsoft Excel* is not automatically installed because doing so requires administrator privilege. You will find its installer in the **installers <version>\RTI Spreadsheet Add-in for Microsoft Excel <version>** directory. See the installation instructions in **installers <version>\RTI Spreadsheet Add-in for Microsoft Excel <version>\RTI\_Spreadsheet\_Addin\_GettingStarted.pdf**.

3. Optionally, install *Wireshark*:

*Wireshark* is not automatically installed because doing so requires administrator privilege. You will find its installer in the **installers <version>\Wireshark <version>** directory. See the installation instructions in **installers <version>\Wireshark <version>\RTI\_Wireshark\_GettingStarted.pdf**.

4. Optionally, download and install *Secure WAN Transport* and *TLS Support*.

You may download them from the RTI Support Portal: <https://support.rti.com/>. Enter your username and password, then select the Downloads tab.

5. See [Installing the License File \(Section 2.4\)](#).

**After Installation:**

- See the documentation for each component. Each of the components may have *Release Notes*, a *Getting Started Guide* or *Installation Guide*, and a *User's Manual*. They can all be accessed through the **Start** menu under **RTI Connex 45x/RTI Connex 4.5x Components/<component name>** (where *x* represents the letter of the current release).

While you can skip the installation instructions in each component's *Getting Started* or *Installation Guide*, please read the rest of the document. These documents may describe other required steps for setting up the components.

**One of the first documents to read is the *RTI Core Libraries and Utilities Getting Started Guide*.**

- Launcher* provides a convenient way to run and configure all of your *Connex Messaging* components. See [Chapter 3: Using RTI Launcher](#).
- To build and run your first *Connex*-based application, see Chapter 3 in the *RTI Core Libraries and Utilities Getting Started Guide*.

### 2.3.1 Installing 32-bit and 64-bit Packages on the Same Machine

*This section describes a special situation not applicable to most users.*

If you need to install both the 32-bit and 64-bit packages on the same machine (for example, if you need 32-bit *and* 64-bit libraries on the same machine for cross compilation), we recommend installing both packages under the same directory.

Note: The 64-bit libraries for *Persistence Service* and *Federation Service* cannot be used on a 32-bit machine. Therefore, if you run the 64-bit version of the *Connex Messaging* installer on a 32-bit machine, *Persistence Service* and *Federation Service* will not be installed. In this

situation, if you had previously installed the 32-bit version of these services, they will still be present.

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## 2.4 Installing the License File

You will receive a license file in an email from RTI.

**To install the license file, follow these steps:**

1. Put the license file named **rti\_license.dat** in the top-level directory where you installed *Connexxt Messaging* (such as **/opt/rti** on Linux systems or **C:\Program Files\RTI** on Windows systems).
2. Set the environment variable **RTI\_LICENSE\_FILE** to the full path of the license file, including the filename (such as **/opt/rti/rti\_license.dat** on Linux systems or **C:\Program Files\RTI\rti\_license.dat** on Windows systems).

If you have any problems with your license file, please email **support@rti.com**.

**Note:** Even if your distribution of *Connexxt Messaging* is not license-managed, you always need a license file to run *Analyzer*, *Monitor* and *Spreadsheet Add-in for Microsoft Excel*.

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## 2.5 Uninstalling Connexxt Messaging

**On a Linux System:**

No uninstaller is provided for *Connexxt Messaging* on Linux systems. Simply remove the directories that you want to uninstall.

To remove the *entire* contents of the installation directory, enter the following (if you changed any files that you want to save, copy them to a new location first):

```
rm -rf <installation directory>
```

**On a Windows System:**

The *Connexxt Messaging* uninstaller will remove *all* the components that were previously installed by the *Connexxt Messaging* installer. It will remove both 32-bit and 64-bit installations, as well as all files that you added to any of the component directories.

Run the uninstaller by selecting **Start, RTI Connex 45x, Uninstall RTI Connex Messaging 4.5x** or **Start, Control Panel, Add or Remove Programs, RTI Connex Messaging 4.5x** (where *x* represents the letter of the current release).

This will not uninstall *Wireshark* or *Spreadsheet Add-in for Microsoft Excel*, since they were not installed by the *Connex Messaging* installer. To uninstall these two components, see the instructions in their individual *Getting Started Guides*.



## Chapter 3 Using RTI Launcher

*Launcher* is a graphical application that allows you to run and configure any installed *Connex* Messaging component. It automatically detects which *Connex* Messaging components are installed and enables their launch buttons.

*Launcher* is automatically installed with *Connex* Messaging.

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### 3.1 Starting Launcher

**On a Linux system:**

- You must have a graphical environment (such as X11, GNOME or KDE) running.
- Open a command prompt and navigate to the *Connex* Messaging installation directory. Run the script **RTI\_Launcher\_<version>/scripts/rtilauncher**.
- Or, use your browser to navigate to your *Connex* Messaging installation directory and double click **RTI\_Launcher\_<version>/scripts/rtilauncher**.

**Note:** If you have the license-managed distribution of *Connex* Messaging, by default at start up *Launcher* will look for the license file named **rli\_license.dat** in the top-level directory where you installed *Connex* Messaging. You can configure *RTI Launcher* to look in a different location by using the [Configuration Tab](#) (Section 3.2.4).

**On a Windows system:**

1. If you have not already done so, you must install the Microsoft Visual C++ 2005 Service Pack 1 Redistributable Package MFC Security Update.

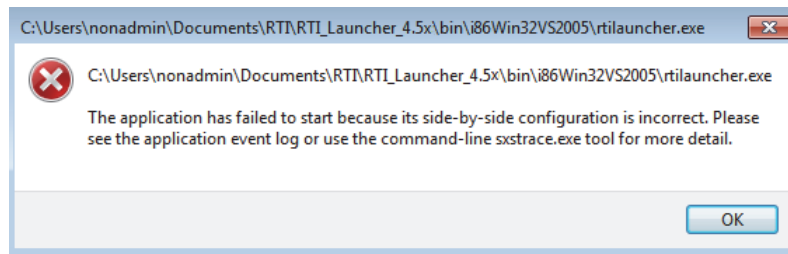
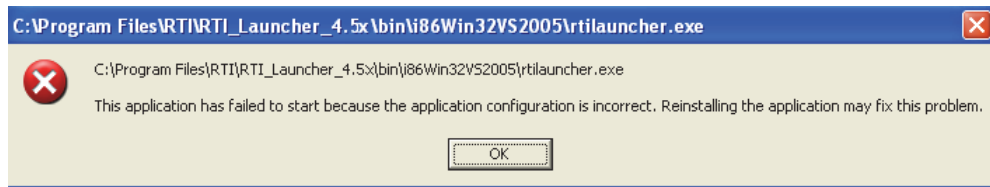
The update is provided in "*<install dir>\installers 4.5x\Microsoft Redist\*" (where *x* represents the letter of the current release) or you can download it from here: <http://www.microsoft.com/download/en/details.aspx?id=26347>

Make sure you install the x86 version, even if you are using a 64-bit machine.

2. Use the **Start** button to select **RTI Connex 45x, RTI Connex 4.5x Launcher** (where *x* represents the letter of the current release).

**Troubleshooting:**

If you see either of these messages when you run *Launcher* on a Windows System, this indicates the Microsoft Visual C++ 2005 Service Pack 1 Redistributable Package MFC Security Update has not been installed.



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## 3.2 A Tour of Launcher

*Launcher's* main window includes four tabs:

- Tools Tab (Section 3.2.1)
- Services Tab (Section 3.2.2)
- Utilities Tab (Section 3.2.3)
- Configuration Tab (Section 3.2.4)

### 3.2.1 Tools Tab

The **Tools** tab includes buttons for:

- ❑ **Analyzer**—displays *Connex*t objects and their communication parameters.
- ❑ **Monitor**—provides a graphical view into your entire *Connex*t application, including QoS and detailed statistics on connections, traffic, errors, and resource usage.
- ❑ **Recording Console**—can record real-time data without having prior knowledge of the data-types or topics in the system; can also replay that data back into the cloud.
- ❑ **Wireshark**—captures RTPS packets, shows their contents, and analyzes network usage.
- ❑ **Spreadsheet Add-in for Microsoft Excel**—integrates *Connex*t with Microsoft Excel. You can use Excel cell functions to subscribe to topic data and then use the data in real-time for formulas, graphs and other Excel features. You can also publish data from a spreadsheet.



To start one of the tools, left-click the tool's button. Right-clicking a button will give you additional options.

If a tool is not installed, its button will be gray and will not work.

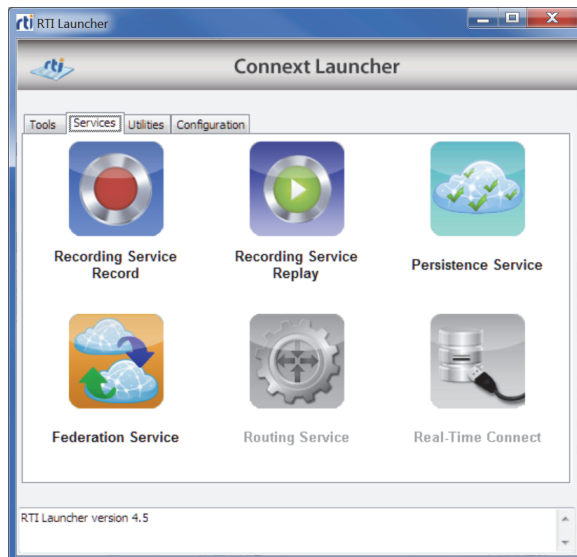
Not all tools are available on all platforms. For example, *Spreadsheet Add-in for Microsoft Excel* is only available on Windows systems.

As described in [Chapter 2](#), *Wireshark* and *Spreadsheet Add-in for Microsoft Excel* are not automatically installed with *Connex*t Messaging. *Launcher* will attempt to detect their presence by examining the registry on Windows systems or the PATH on Linux systems.

### 3.2.2 Services Tab

The **Services** tab includes buttons to launch:

- ❑ **Recording Service - Record**  
—records real-time data without having prior knowledge of the data-types or topics in the system. (This service is also available by using *Recording Console* in the *Tools* tab.)
- ❑ **Recording Service - Replay**  
—replays recorded data by injecting it back into the cloud. You can change data rates and QoS settings. (This service is also available by using *Recording Console* in the *Tools* tab.)

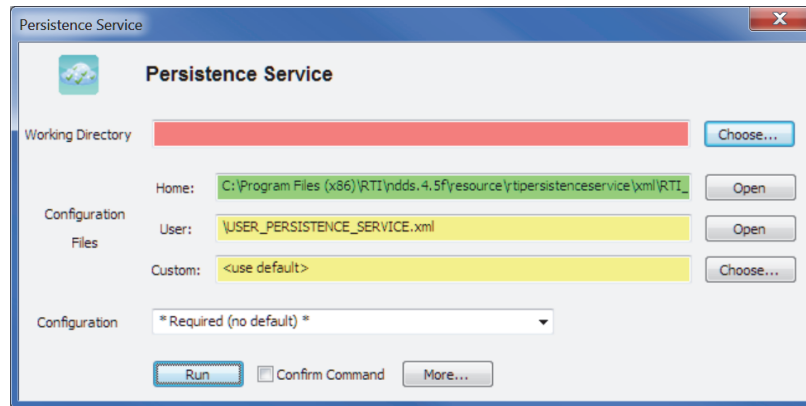


- ❑ **Persistence Service**  
—saves data from *Connex* publishing applications to memory or permanent storage, so it can be delivered to subscribing applications that join the system at a later time—even if the publishing application has already terminated. Data can be persisted to files or an external database.
- ❑ **Federation Service**—integrates disparate and geographically dispersed systems. It scales *Connex* applications across domains, LANs and WANs, including firewall and NAT traversal.
- ❑ **Routing Service**—like *Federation Service*, but also supports *Connex*-to-*Connex* bridging by allowing you to make transformations in the data along the way. This service is not installed with *Connex Messaging*; it is available as part of *RTI Connex Integrator*.
- ❑ **Real-Time Connect**—provides bidirectional integration between *RTI Data Distribution Service* and a database (Oracle Database, Oracle TimesTen In-Memory Database, or MySQL). This component is not installed with *Connex Messaging*; it is available as part of *RTI Connex Integrator*.

If a tool is not installed, its button will be gray and will not work.

To start one of the services, left-click the appropriate button, use the resulting dialog to configure the service, then click **Run** at the bottom of the configuration dialog. The service will start in a separate command window.

The configuration dialog is similar for all the services. For example, the configuration dialog for *RTI Persistence Service* looks similar to this:



As seen above, some fields are highlighted in colors.

- Green indicates a field has a valid entry.
- Yellow indicates an entry is missing but it is not a required field.
- Red indicates a field that must be filled in.

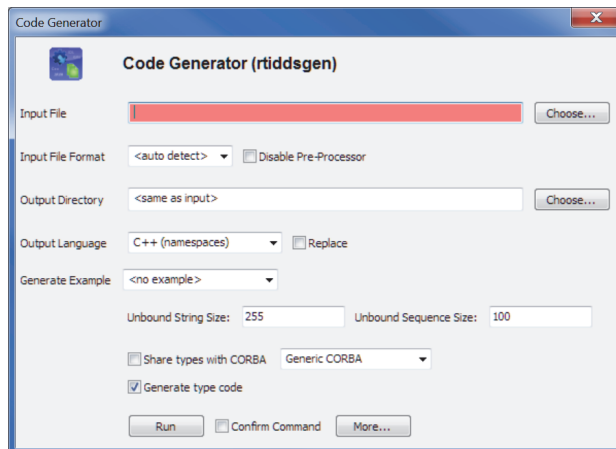
### 3.2.3 Utilities Tab

The **Utilities** tab includes buttons for:

- ❑ **Code Generator**—generates example code and makefiles/project files for your data types.
- ❑ **Type Conversion**—converts data type formats between XML, IDL, and XSD.
- ❑ **Recording Service-Convert**—converts to commonly accepted formats for export to data analysis tools.
- ❑ **Shapes Demo**—demonstrates *Connex* capabilities by publishing and subscribing to colored moving shapes.
- ❑ **DDS Spy**—subscribes to any DDS data.
- ❑ **DDS Ping**—publishes DDS ping messages to test system connectivity.

Each utility's configuration dialog is different; some have required parameters.

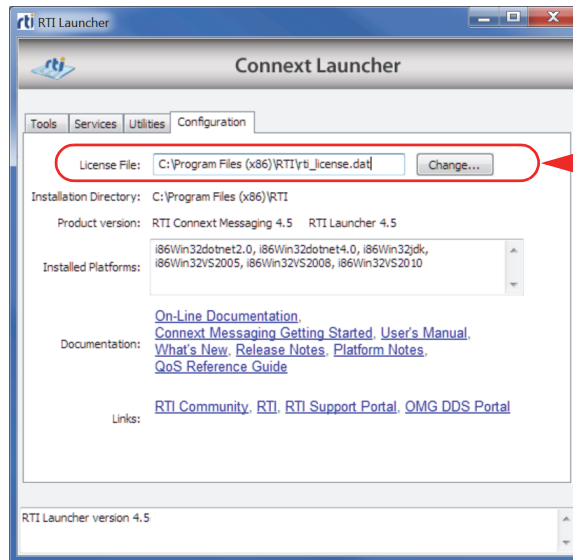
For example, in *rtiddsgen*'s configuration dialog, you must specify an input file, as indicated by the red field shown in the dialog to the right:



### 3.2.4 Configuration Tab

The **Configuration** tab:

- ❑ Displays the installation directory in which *Launcher* will look for components.
- ❑ For license-managed distributions only: Displays and allows changes to the license file location—it must point to a valid *Connexxt Messaging* license file. See [Installing the License File \(Section 2.4\)](#).
- ❑ Displays the *Connexxt Messaging* version number and installed platforms.
- ❑ Provides links to documentation and other resources.



With a license-managed distribution, you can change the license file location here.

