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The security features of this product include software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/). This product includes cryptographic software written by Eric Young (eay@cryptsoft.com). This product includes software written by Tim Hudson (tjh@cryptsoft.com).

Notice

Any deprecations noted in this document serve as notice under the Real-Time Innovations, Inc. Maintenance Policy #4220.

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1 Introduction

RTI® TLS Support is an optional product for use with the TCP transport that is included with RTI Connext® DDS. If you choose to use TLS Support, it must be installed on top of a Connext DDS installation with the same version number; it can only be used on architectures that support TCP transport.

To see a simple ‘Hello, World’ example application that uses TCP and TLS, look in the hello_world_gtcp example directory for C. (See 2 Paths Mentioned in Documentation on page 2 for the path to the examples.)
2 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-6.1.1`
  
  - Linux systems, non-root user:
    `/home/<your user name>/rti_connext_dds-6.1.1`
  
  - Linux systems, root user:
    `/opt/rti_connext_dds-6.1.1`
  
  - Windows® systems, user without Administrator privileges:
    `<your home directory>\rti_connext_dds-6.1.1`
  
  - Windows systems, user with Administrator privileges:
    `C:\Program Files\rti_connext_dds-6.1.1`

You may also see $NDDSHOME$ or `%NDDSHOME%`, which refers to an environment variable set to the installation path.

Wherever you see `<NDDSHOME>` used in a path, replace it with your installation path.

**Note for Windows Users:** When using a command prompt to enter a command that includes the path `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-6.1.1\bin\rtiddsgen"
```

Or if you have defined the NDDSHOME environment variable:

```
"%NDDSHOME%\bin\rtiddsgen"
```
By default, examples are copied into your home directory the first time you run *RTI Launcher* or any script in `<NDDSHOME>/bin`. This document refers to the location of the copied examples as `<path to examples>.

Wherever you see `<path to examples>`, replace it with the appropriate path.

Default path to the examples:

- macOS systems: `/Users/<your user name>/rti_workspace/6.1.1/examples`
- Linux systems: `/home/<your user name>/rti_workspace/6.1.1/examples`
- Windows systems: `<your Windows documents folder>\rti_workspace\6.1.1\examples`

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

Note: You can specify a different location for `rti_workspace`. You can also specify that you do not want the examples copied to the workspace. For details, see *Controlling Location for RTI Workspace and Copying of Examples* in the *RTI Connext DDS Installation Guide*. 
3 Download Instructions


You will need your username and password to log into the portal; these are included in the letter confirming your purchase or evaluation copy. If you do not have this letter, please contact license@rti.com.

TLS Support also requires OpenSSL. OpenSSL is available from RTI’s Support Portal, or you may obtain it from another source.

Once you have logged into the portal, select the Downloads link, then select the appropriate version of TLS Support and OpenSSL for your platform.

For TLS Support, download both:

- rti_tls_host_support-6.1.1-<host platform>.rtipkg
- rti_tls_support-6.1.1-<target architecture>.rtipkg

For OpenSSL, download both:

- openssl-1.1.1n-6.1.1-host-<host platform>.rtipkg
- openssl-1.1.1n-6.1.1-target-<target architecture>.rtipkg

Architecture names are described in the RTI Connext DDS Core Libraries Platform Notes.

If you need help with the download process, contact support@rti.com.
4 Installing on Windows Systems

You do not need administrator privileges. All directory locations are meant as examples only; adjust them to suit your site. <NDDSHOME> is described in 2 Paths Mentioned in Documentation on page 2.

1. Install the TLS Support host and target .rtipkg files on top of Connext DDS.

   There are two ways to install: from RTI Launcher or from the command line.

   **To install from RTI Launcher:**
   a. Start RTI Launcher:
   
   ```
   cd <NDDSHOME>
   bin\rtilauncher
   ```
   b. From the **Configuration** tab, click on **Install RTI Packages**.
   c. Use the + sign to add the .rtipkg files that you want to install.
   d. Click **Install**.

   **To install from the command line:**
   
   ```
   cd <NDDSHOME>
   bin\rtipkginstall <path to .rtipkg file>
   ```

   The installer will put the TLS libraries in <NDDSHOME>\lib\<architecture>.

2. If not already included, add <NDDSHOME>\lib\<architecture> to your Path environment variable. For example (enter this on one line):

   ```
   set PATH=<NDDSHOME>\lib\<architecture>;%PATH%
   ```

3. Optionally, install the OpenSSL host package. This is needed if you want to use TLS Support with tools such as RTI Admin Console. (Use the same process that you used for the .rtipkg files above.)
4. Install the OpenSSL target package. (Use the same process that you used for the .rtipkg files above.)

The installer will put the OpenSSL target libraries in `<NDDSHOME>\third_party\openssl-1.1.1n\<architecture>`.

5. Add the OpenSSL lib directory to your Path environment variable. For example, assuming you want to use the "release" version of the OpenSSL libraries (enter this on one line):

   ```
   set PATH=
   <NDDSHOME>\third_party\openssl-1.1.1n\<architecture>\release\lib;%PATH%
   ```

6. To verify your OpenSSL installation, enter:

   ```
   openssl version
   ```

   You should see a response similar to:

   ```
   OpenSSL <version>
   ```

   If you get a version other than OpenSSL 1.1.1n, your PATH may be pointing with a higher precedence to a different version of OpenSSL. You may need to place version 1.1.1n first or earlier in your PATH.

   You may run into this OpenSSL warning:

   ```
   WARNING: can't open config file: [default openssl built-in path]\openssl.cnf
   ```

   To resolve this issue, set the environment variable OPENSSL_CONF to the path to the `openssl.cnf` file you are using. For example (enter this all on one line):

   ```
   set OPENSSL_CONF=
   <NDDSHOME>\third_party\openssl-1.1.1n\<architecture>\release\ssl\openssl.cnf
   ```
5 Installing on Linux and Other Systems

This chapter applies to all supported operating systems except Windows, which is covered in 4 Installing on Windows Systems on page 5.

All directory locations are meant as examples only; adjust them to suit your site. <NDDSHOME> is described in 2 Paths Mentioned in Documentation on page 2.

1. Install the TLS Support host and target .rtipkg files on top of Connext DDS.

   There are two ways to install: from RTI Launcher or from the command line.

   **To install from RTI Launcher:**
   a. Start RTI Launcher:

      ```
      cd <NDDSHOME>
      ./bin/rtilauncher
      ```
   b. From the Configuration tab, click on Install RTI Packages.
   c. Use the + sign to add the .rtipkg files that you want to install.
   d. Click Install.

   **To install from the command line:**

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

   The installer will put the TLS libraries in <NDDSHOME>/lib/<architecture>.

2. If not already included, add <NDDSHOME>/lib/<architecture> to your library search path (pointed to by the LD_LIBRARY_PATH environment variable on Linux systems, DYLD_LIBRARY_PATH on macOS systems).

   For example (enter this on one line):

      ```
      export LD_LIBRARY_PATH=
      <NDDSHOME>/lib/<architecture>:</{LD_LIBRARY_PATH}
      ```
3. Optionally, install the OpenSSL host package. This is needed if you want to use TLS Support with tools such as RTI Admin Console. (Use the same process that you used for the .rtipkg files above.)

4. Install the OpenSSL target package. (Use the same process that you used for the .rtipkg files above.)

   The installer will put the OpenSSL target libraries in `<NDDSHOME>/third_party/openssl-1.1.1n/<architecture>`.

5. Add the OpenSSL lib directory to your library search path. For example, assuming you want to use the "release" version of the OpenSSL libraries (enter this on one line):

   ```bash
   export LD_LIBRARY_PATH=
   <NDDSHOME>/third_party/openssl-1.1.1n/<architecture>/release/lib:${LD_LIBRARY_PATH}
   ```

6. To verify your OpenSSL installation, enter:

   ```bash
   openssl version
   ```

   You should see a response similar to:

   ```bash
   OpenSSL <version>
   ```

   If you get a version other than OpenSSL 1.1.1n, your PATH may be pointing with a higher precedence to a different version of OpenSSL. You may need to place version 1.1.1n first or earlier in your PATH.

   You may run into this OpenSSL warning:

   ```bash
   WARNING: can't open config file: [default openssl built-in path]/openssl.cnf
   ```

   To resolve this issue, set the environment variable OPENSSL_CONF to the path to the `openssl.cnf` file you are using. For example (enter this all on one line):

   ```bash
   export OPENSSL_CONF=
   <NDDSHOME>/third_party/openssl-1.1.1n/<architecture>/release/ssl/openssl.cnf
   ```