RTI Limited Bandwidth Plugins

Release Notes

Version 7.0.0
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 solely under and subject to RTI's standard terms and conditions available at https://www.rti.com/terms and in accordance with your License Acknowledgement Certificate (LAC) and Maintenance and Support Certificate (MSC), except to the extent otherwise accepted in writing by a corporate officer of RTI.

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/). This product includes cryptographic software written by Eric Young (eay@cryptsoft.com). This product includes software written by Tim Hudson (tjh@cryptsoft.com).

Notices

Deprecations and Removals

Any deprecations or removals noted in this document serve as notice under the Real-Time Innovations, Inc. Maintenance Policy #4220 and/or any other agreements by and between RTI and customer regarding maintenance and support of RTI’s software.

Deprecated means that the item is still supported in the release, but will be removed in a future release. Removed means that the item is discontinued or no longer supported. By specifying that an item is deprecated in a release, RTI hereby provides customer notice that RTI reserves the right after one year from the date of such release and, with or without further notice, to immediately terminate maintenance (including without limitation, providing updates and upgrades) for the item, and no longer support the item, in a future release.
“Real-Time Innovations, Inc. (‘RTI’) licenses this Early Access release software (‘Software’) to you subject to your agreement to all of the following conditions:

(1) you may reproduce and execute the Software only for your internal business purposes, solely with other RTI software licensed to you by RTI under applicable agreements by and between you and RTI, and solely in a non-production environment;

(2) you acknowledge that the Software has not gone through all of RTI’s standard commercial testing, and is not maintained by RTI’s support team;

(3) the Software is provided to you on an “AS IS” basis, and RTI disclaims, to the maximum extent permitted by applicable law, all express and implied representations, warranties and guarantees, including without limitation, the implied warranties of merchantability, fitness for a particular purpose, satisfactory quality, and non-infringement of third party rights;

(4) any such suggestions or ideas you provide regarding the Software (collectively, “Feedback”), may be used and exploited in any and every way by RTI (including without limitation, by granting sub-licenses), on a non-exclusive, perpetual, irrevocable, transferable, and worldwide basis, without any compensation, without any obligation to report on such use, and without any other restriction or obligation to you; and

(5) TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT WILL RTI BE LIABLE TO YOU FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE OR CONSEQUENTIAL DAMAGES OF ANY KIND, OR FOR LOST PROFITS, LOST DATA, LOST REPUTATION, OR COST OF COVER, REGARDLESS OF THE FORM OF ACTION WHETHER IN CONTRACT, TORT (INCLUDING WITHOUT LIMITATION, NEGLIGENCE), STRICT PRODUCT LIABILITY OR OTHERWISE, WHETHER ARISING OUT OF OR RELATING TO THE USE OR INABILITY TO USE THE SOFTWARE, EVEN IF RTI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.”

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

Release Notes

1 Supported Platforms ............................................................................................................. 1
  1.1 Requirements when Using Microsoft Visual Studio .................................................... 1

2 Compatibility ....................................................................................................................... 1

3 What's New in 7.0.0 ............................................................................................................. 2
  3.1 DDS-XML format for Limited Bandwidth Endpoint Discovery Plugin .................................. 2
  3.2 Third-Party Software Upgrades ..................................................................................... 3

4 What's Fixed in 7.0.0 ............................................................................................................. 3
  4.1 Memory Leak when ZRTPS or LBRTPS Sub-Transport Library was Set .............................. 3
  4.2 Crash when Installing Some DataReader Listeners in DomainParticipant that used LBPD .......... 4
  4.3 Segmentation Fault if Participant with ZRTPS or LBRTPS Transports Enabled also used TCP sub-transport ........................................................................................................... 4
  4.4 Memory Leak when External Compression Library Set and Used for ZRTPS Transport .............. 4
  4.5 Fixes Related to Vulnerabilities ...................................................................................... 5

5 Known Issues ....................................................................................................................... 5
  5.1 Transport-Related Limitations for ZRTPS ....................................................................... 5
  5.2 Some QoS not Supported by LBED Plugin ....................................................................... 6
  5.3 Some Features not Supported ........................................................................................ 6
  5.4 Some Information not Propagated by LBED Plugin .......................................................... 6

6 Available Documentation .................................................................................................... 7
Release Notes

1 Supported Platforms

See the column for Limited Bandwidth Plugins in the table of Supported Platforms for Compiler-Dependent Products, in the RTI Connext Core Libraries Release Notes.

1.1 Requirements when Using Microsoft Visual Studio

You must have the appropriate Microsoft® Visual Studio® Redistributable Package installed on the machine where you are running an application linked with dynamic libraries. For details, see the RTI Connext Core Libraries Platform Notes.

2 Compatibility

Limited Bandwidth Plugins is an optional product for use with Connext with the same version number.

The plugins are not fully tested and supported in combination with RTI DDS Spy (rtiddsspy), RTI Recording Service, RTI Shapes Demo, RTI Persistence Service, or RTI Database Integration Service.

When using the LBPD plugin with RTI Routing Service, either the key or participant_name property may be used. If the participant_name property is used, it must match the participant name generated by Routing Service, which uses this format for naming participants: "RTI Routing Service: <service name>.<domain_route name>#\{1,2\}".

For backward-compatibility information between this and previous releases, see the Migration Guide on the RTI Community Portal (https://community.rti.com/documentation).
3 What's New in 7.0.0

3.1 DDS-XML format for Limited Bandwidth Endpoint Discovery Plugin

The Limited Bandwidth Endpoint Discovery (LBED) plug-in uses an XML file to statically specify the QoS (and other information, such as the Topic or type being used) of the endpoints that should be "discovered." However, in previous versions, this XML (the way to specify the configuration, the labels, the schema, etc.) did not follow the OMG’s DDS Consolidated XML Syntax (DDS-XML), unlike other RTI elements such as USER_QOS_PROFILES.xml, XML-Based Application Creation, or RTI System Designer. This created in the RTI ecosystem the coexistence of two different ways to define DDS systems using XML: the standardized one used by most tools and the one that only LBED uses.

Since it is possible to represent the LBED configuration using DDS-XML, this release has updated the LBED plugin to follow the DDS-XML standard. This way, if you already have a DDS-XML description of your system, it can be used directly for LBED, without needing to translate it to another schema. If you don’t have the DDS-XML description of your system, now you can create it using RTI System Designer: the resultant XML file will be compatible with LBED.

The usage of the DDS-XML standard gives the plug-in more flexibility in specifying QoS for your endpoints: QoS libraries and profiles (including the built-in ones) can be used. Also, it is possible to take advantage of the inheritance between profiles.

While improving the LBED XML configuration, other changes were made to improve ease of use and LBED functionality:

- In previous versions of the plugin, a separate XML file was required for specifying the LBED information of the endpoints that needed to be discovered. Now, the usage of an external XML file is optional and it is possible to specify the LBED information in the same XML file in which you specify the QoS policies of your entities (e.g., USER_QOS_PROFILES.xml). In this way, USER_QOS_PROFILES.xml could act as an “XML database of DDS Entities”, containing information of a local application’s entities (like their QoS profiles or XML-Based Application Creation definitions) as well as the information that the plug-in requires of other applications’ entities that need to be discovered.

- In addition to the LBED properties, in the new version of the plugin there is an alternative way of enabling the LBED plugin for a DomainParticipant that requires fewer changes in the configuration: setting the BuiltIn Discovery Plugins mask with the DPSE (Dynamic Participant discovery, Static Endpoint discovery) value.

- When LBED is used, you need to manually define an RTPS object ID for each endpoint in the application. Now, if you use XML-Based Application Creation in your applications, you don’t need to specify the RTPS object ID; the new version of LBED is able to automatically determine the corresponding RTPS Object ID of each endpoint.
• In previous versions of the plug-in, the TRANSPORT_MULTICAST and TRANSPORT_UNICAST QoS policies only supported the UDPv4 transport. Now, both QoS policies support all Connext built-in transport plugins:
  
  • Multicast supports UDPv4 and UDPv6.
  
  • Unicast supports UDPv4, UDPv6, and SHMEM. It also supports the RTI Real-Time WAN Transport (UDPv4_WAN).

• RTI has improved the debuggability of the LBED plugin with more meaningful log messages and the usage of Activity Contexts.

To learn more about how the new LBED plug-in works and its features, see RTI Limited Bandwidth Plugins User's Manual. The new "Limited Bandwidth Endpoint Discovery Plugin" chapter guides you step by step to modify a generated Connext project to use the Limited Bandwidth Endpoint Discovery plugin.

3.2 Third-Party Software Upgrades

The following third-party software used by Limited Bandwidth Plugins has been upgraded.

<table>
<thead>
<tr>
<th>Third-Party Software</th>
<th>Previous Version</th>
<th>Current Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zlib</td>
<td>1.2.11</td>
<td>1.2.12</td>
</tr>
</tbody>
</table>

This upgrade may fix potential vulnerabilities. See 4.5 Fixes Related to Vulnerabilities on page 5.

For information on third-party software used by Connext products, see the “3rdPartySoftware” documents in your installation: <NDDSHOME>/doc/manuals/connext_dds_professional/release_notes_3rdparty.

4 What's Fixed in 7.0.0

4.1 Memory Leak when ZRTPS or LBRTPS Sub-Transport Library was Set

When using the ZRTPS and LBRTPS transport plugins, and a sub-transport was set using the dds.transport.<lbrtps|zrtps>.subtransport properties, the library defined in these properties was opened and never closed, causing a memory leak.

This behavior has been fixed. Now the sub-transport library is correctly closed when the ZRTPS or LBRTPS transport is destroyed.

[RTI Issue ID COREPLG-602]
4.2 Crash when Installing Some DataReader Listeners in DomainParticipant that used LBPD

The Limited Bandwidth Participant Discovery (LBPD) Plugin, internally creates a DataWriter and a DataReader for exchanging the static discovery information. These endpoints are created using the user DomainParticipant (the one in which you enabled the plugin).

If you installed a DataReader listener in your DomainParticipant with LBPD, that listener was also installed for LBPD's internal DataReader. When the listener’s associated event was triggered for the internal DataReader, a crash occurred because the internal endpoints did not have all the information required for exercising the user listeners.

The issue did not occur for DataWriter listeners because none of the currently available events can be triggered for the internal LBPD DataWriter. Not all DataReader listeners caused a crash. The internal DataReader has some listeners already installed which override the user's listeners. The latter are as follows:

- on_data_available()
- on_sample_lost()
- on_sample_rejected()
- on_requested_incompatible_qos()

The issue has been fixed. Now, users’ listeners installed at the DomainParticipant level are not invoked for the internal LBPD endpoints.

[RTI Issue ID COREPLG-604]

4.3 Segmentation Fault if Participant with ZRTPS or LBRTPS Transports Enabled also used TCP sub-transport

Participants with the ZRTPS or LBRTPS transport plugins enabled, used in combination with TCP as a sub-transport (achieved by loading the property dds.transport.<lbrtps|zrtps>.subtransport) would fail with a segmentation fault on the receiving thread after processing the received message. This problem has been fixed.

[RTI Issue ID COREPLG-620]

4.4 Memory Leak when External Compression Library Set and Used for ZRTPS Transport

When using the ZRTPS transport plugin and an external compression library (the property dds.transport.zrtps.compression_library was set to EXTERNAL_COMPRESSION), the library set in the property dds.transport.zrtps.external_library was opened and never closed, causing a memory leak.
This problem has been resolved. Now the external library is correctly closed when the ZRTPS transport is destroyed.

[RTI Issue ID COREPLG-629]

4.5 Fixes Related to Vulnerabilities

This release fixes some potential vulnerabilities, described below.

4.5.1 Potential memory corruption when using Zlib compression due to vulnerability in Zlib

The ZRTPS transport in the Limited Bandwidth Plugins had a third-party dependency on Zlib version 1.2.11, which is known to be affected by one publicly disclosed vulnerability.

This vulnerability has been fixed by upgrading Zlib to the latest stable version, 1.2.12. See 3.2 Third-Party Software Upgrades on page 3 for more details.

The impacts on Connext applications of using the previous version were:

- Out-of-bounds memory accesses, crashing the application
- Exploitable by triggering compression of an RTPS message with a malicious payload
- CVSS v3.1 Score: 7.5 HIGH
- CVSS v3.1 Vector: AV:N/AC:L/PR:N/UI:N/S:U/C:N/I:N/A:H

[RTI Issue ID COREPLG-631]

5 Known Issues

Note: For an updated list of critical known issues, see the Critical Issues List on the RTI Customer Portal at https://support.rti.com.

See also the "Known Issues" section in the "Limited Bandwidth Endpoint Discovery Plugin" chapter of the RTI Limited Bandwidth Plugins User's Manual.

5.1 Transport-Related Limitations for ZRTPS

The following are known transport-interaction limitations when using the ZRTPS transport plugin:

- Neither Shared Memory (SHMEM) nor UDPv6 may be used as sub-transports.
- The UDPv4 transport may not be used simultaneously as a transport and a ZRTPS sub-transport.
5.2 Some QoS not Supported by LBED Plugin

The following DataWriter and DataReader QoSs are known not to be supported in the plugin's implementation. This will be addressed in a future release.

- AvailabilityQosPolicy
- TypeConsistencyEnforcementQosPolicy
- DataRepresentationQosPolicy
- DataTagQosPolicy
- EntityNameQosPolicy
- DataReaderProtocolQosPolicy::expects_inline_qos


5.3 Some Features not Supported

The following features are not currently supported by the LBPD Plugin:

- Security
- TopicQueries
- The \texttt{locator\_reachability\_lease\_duration} in the DiscoveryConfigQosPolicy
- Propagation of properties in the PropertyQosPolicy during discovery

The following features are not currently supported by the LBED Plugin:

- Security
- Custom content filters
- Writer-side content filtering

5.4 Some Information not Propagated by LBED Plugin

Some information is not propagated in Static Endpoint Discovery. LBED does not populate the following remote endpoints' information when registering them (i.e., they won't be available in the Publication/Subscription BuiltinTopicData):

- TypeCode
- LocatorFilterQosPolicy
6 Available Documentation

The following documentation is provided with Limited Bandwidth Plugins:

- **Installation Guide:**
  `<NDDSHOME>/doc/manuals/addon_products/limited_bandwidth_plugins/RTI_LimitedBandwidthPlugins_InstallationGuide.pdf`

- **User’s Manual:**

- **Example code:**
  `<path to examples>/connext_dds/<c or c++11>/limited_bandwidth_plugins`

`<NDDSHOME>` refers to the installation directory for Connext.

`<path to examples>` is `/home/<your user name>/rti_workspace/version/examples` for Linux® and `<your Windows documents folder>/rti_workspace/version/examples` for Windows®.