



D3.2

Micro XRCE-DDS for ROS Software Release Y2

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Abstract	This document provides links to the released software and documentation for deliverable D3.2 <i>Micro XRCE-DDS for ROS Software Release Y2</i> of the Task 3.1 <i>micro-RTPS Additional Features</i> .



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1 Summary

eProxima Micro XRCE-DDS is a software solution which allows to communicate eXtremely Resource Constrained Environments (XRCEs) with an existing DDS network. This implementation complies with the specification proposal, “eXtremely Resource Constrained Environments DDS (DDS-XRCE)” submitted to the Object Management Group (OMG) consortium.

Micro XRCE-DDS implements a client-server protocol to enable resource-constrained devices (clients) to take part in DDS communications. Micro XRCE-DDS Agent (server) makes possible this communication. The Micro XRCE-DDS Agent acts on behalf of the Micro XRCE-DDS Clients and enables them to take part as DDS publishers and/or subscribers in the DDS Global Data Space. Micro XRCE-DDS provides both, a plug and play Micro XRCE-DDS Agent and an API layer which allows you to implement your Micro XRCE-DDS Clients.

2 Acronyms and keywords

Acronym	Explanation
CDR	Common Data Representation
DDS	Data Distribution Service
DDS-XRCE	DDS For Extremely Resource Constrained Environments
GA	Grant Agreement
OFERA	Open Framework for Embedded Robotic Applications
OMG	Object Management Group
ROS	The Robot Operating System
RTPS	Real Time Publish Subscribe

3 Overview to Results

This document provides links to the released software and documentation for deliverable D3.2 *Micro XRCE-DDS for ROS Software Release Y1* of Task 3.1 *micro-RTPS Additional Features*.

A minor deviation from the OFERA Grant Agreement is the name of this deliverable. micro-RTPS is no more called micro-RTPS. With its first official release eProxima, changed its name to Micro XRCE-DDS as it is a more accurate name regarding the implemented protocol implemented.

The work done on the task 3.1 was to improve and adapt the previous versions to the needs of micro-ROS. In this direction this year added features:

- Improve portability to new systems and added FreeRTOS support.
- Added IPv6 support.
- Add Agent security profile.
- Improve memory usage and threading model in Agent side.
- Discovery support.
- Message fragmentation support.

- Services support.
- Support Fast RTPS 1.8.x and 1.9.X (Support for ROS 2 Dashing and ROS 2 Eloquent).

The annexe of this document includes a copy of the official product information page. A documentation annexe has been omitted due to its extension. However, links have been provided.

4 Links to Software Repositories

Micro XRCE-DDS is distributed as an open source software. The full suite is composed by multiple repositories:

Micro XRCE-DDS Client:

- Git repository: <https://github.com/eProsima/Micro-XRCE-DDS-Client>

Branch	Latest commit	ROS 2 version
v1.1.5	2cb3999	dashing/eloquent
develop	fd52a25	dashing/eloquent + services

Micro XRCE-DDS Agent:

- Git repository: <https://github.com/eProsima/Micro-XRCE-DDS-Agent>

Branch	Latest commit	ROS 2 version
v1.1.6	cb1d053	dashing
develop	eee265d	dashing + services
feature/eloquent	ad87a66	eloquent

a central repository, Micro XRCE-DDS:

- Git repository: <https://github.com/eProsima/Micro-XRCE-DDS>

and a readthedocs documentation:

- Documentation: <https://micro-xrce-dds.readthedocs.io/en/latest/>

5 Annex 1: eProsima Micro XRCE-DDS

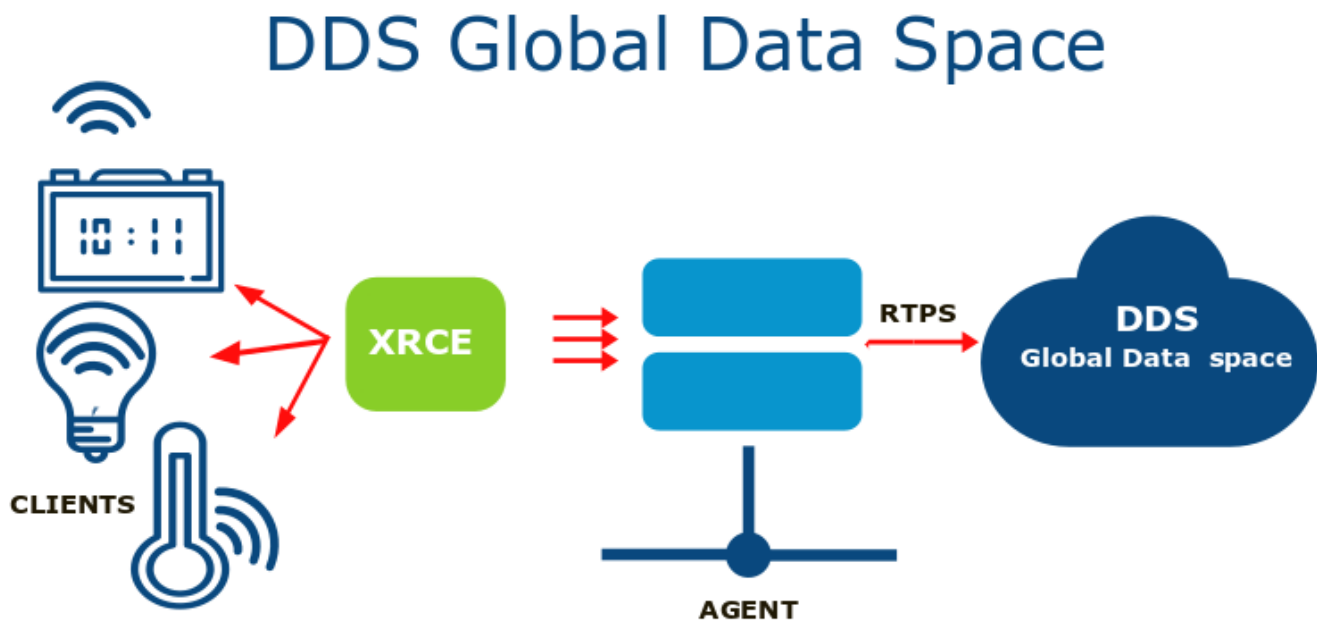
Content of product description web from eProsima from 19th December 2019.

5.1 Open source solution

eProsima Micro XRCE-DDS is an open source wire protocol that implements the OMG DDS for extremely Resource Constrained Environment standard ([DDS-XRCE](#)). The aim of the DDS-XRCE protocol is to provide access to the DDS Global-Data-Space from resource-constrained devices. This is achieved as a result of a client-server architecture, where low resource devices, called XRCE Clients, are connected to a server, called XRCE Agent, which acts on behalf of its clients in the DDS Global-Data-Space.

Micro XRCE-DDS is composed by two main elements:

- [Micro XRCE-DDS Agent](#): a CPP 11 out-of-the-box application which implements the XRCE Agent functionality.
- [Micro XRCE-DDS Client](#): a C99 library which implements the XRCE Client-side functionality.



Apart from the ones mentioned above, Micro XRCE-DDS uses two additional components:

- [Micro CDR](#): a de/serialization engine used in the Client library.
- [Micro XRCE-DDS Gen](#): a code generator tool creating Micro CDR de/serialization functions and Client apps examples from IDL sources.

5.1.1 MAIN FEATURES:

Low Resource Consumption

- The design and implementation of this middleware consider the memory restriction of the devices.

- Micro XRCE-DDS Client is completely dynamic memory free, allocating all the memory at start-up.
- From the point of view of memory footprint, the latest version of this library has a memory consumption of less than **75 KB of Flash memory** and **2.5 KB of RAM** for a complete publisher and subscriber application.

Multi-Transport Support

- Contrary to other IoT middleware such as MQTT and CoaP which work over only a particular transport layer, XRCE supports multiple transport protocol natively. In particular, the latest version of Micro XRCE-DDS supports **UDP**, **TCP**, and a custom **Serial** transport protocol.
- eProsima Micro XRCE-DDS has a transport interface for both Agent and Client which simplifies a transport custom design. This gives the user the possibility of implementing easily the port of Micro XRCE-DDS to different platforms and the addition of new transports.

Multi-Platform Support

- eProsima Micro XRCE-DDS Client supports **Windows**, **Linux**, and **NuttX** as embedded RTOS.
- eProsima Micro XRCE-DDS Agent supports **Windows** and **Linux** platform.

5.1.2 UPCOMING FEATURES:

- Peer-to-peer communication.
- Message fragmentation support.
- Programmable Agent through modern CPP API.
- FreeRTOS support.
- Application configuration.

5.1.3 AVAILABLE DOCUMENTATION:

- [Manual](#)
- [Shapedemo video](#)

5.1.4 APPLICATION:

Micro XRCE-DDS is focused on microcontroller applications which require a publisher/subscriber architecture. Some examples of this kind of applications are found in a sensor network, IoT or robotics.

Some important companies such as [Renesas](#) and [ROBOTIS](#) are using already Micro XRCE-DDS as their middleware solution. Furthermore, the [micro-ROS](#) project, an extension of [ROS2 \(The Robot Operating System\)](#) for microcontrollers, has adopted Micro XRCE-DDS as its middleware layer, easing the adoption of Micro XRCE-DDS by a big community of developers with thousands of robotic and IoT active projects.

MORE INFORMATION ABOUT EPROSIMA MICRO XRCE-DDS:

For any questions please contact info@eprosima.com