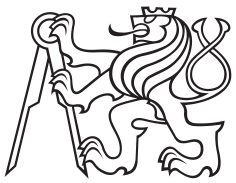
Master's Thesis



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F3

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Implementation of actual version of DDSI-RTPS protocol for distributed control in Ethernet network

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Acknowledgement / Declaration

Podekovani..

Prohlasuji..

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Abstrakt / Abstract

Czech abstract..

Klíčová slova: RTPS, ORTE, Ethernet, Real-Time

Překlad titulu: Implementace aktuální verze protokolu DDSI-RTPS pro distribuované řízení v síti Ethernet

English abstract..

Keywords: RTPS, ORTE, Ethernet, Real-Time

/ Contents

[intro]

Chapter 1
Introduction

The Real-Time Publish-Subscribe (RTPS)[1] is the protocol of Data Distribution Service (DDS)[2] family, supporting Data-Centric Publish-Subscribe in real time and specifying communication in a decentralized network, where multiple nodes needs to send and/or receive data in real time. Specification of protocol is being developed by Object Management Group[3] - international, open membership, not-for-profit technology standards consortium, since version 1.0 on February 2002 till version 2.2 on September 2014.

This thesis aims on upgrading ORTE implementation of RTPS protocol to be compatible with the latest standard version 2.2. The structure is as follows. In Chapter 1, there is an introduction to RTPS and ORTE. Chapter 2 compares implemented RTPS 1.0 with the latest RTPS 2.2, chapter 3 covers changes needed for compatibility with version 2.2 of the RTPS protocol and chapter 4 covers testing of new implementation of RTPS protocol in ORTE. In chapter 5, demo application of ORTE called *Shape* for Android is introduced. The application was developed as part of familiarization with ORTE, therefore ORTE with RTPS 1.0 implementation is used in this application. Security for DDS is discussed in chapter 6.

1.1 DDS

There are two main models used in Data Distribution Services. *Centralized* model, where single server for the whole network is needed and all communication goes throw it, introduces single point of failure. When the server is unreachable, the whole network is non-functional. By contrast, *decentralized* approach has no central server, no single point of failure. When one node of the network is non-functional, the rest of the network can continue in data transfers.

1.2 DCPS

In the Data-Centric Publish-Subscribe network, data are sent by *Publishers* and received by *Subscribers*. Node can be *Publisher*, *Subscriber* or both and each node can be interested in different data, timing and reliability. Data-Centric Publish-Subscribe network is responsible for delivery of right data between right nodes with right parameters.

[rfc-1]

1.3 RTPS

Real-Time Publish-Subscribe is wire protocol developed to ensure interoperability between DDS implementations. It has been designed to be fault tolerant (decentralized), scalable, tunable, with plug-and-play connectivity and ability of best-effort and reliable communication in real time applications.

1.4 ORTE

Open Real-Time Ethernet (ORTE)[4] is the implementation of RTPS 1.0. It's implemented in Application layer of UDP/IP stack, written in C, under open source license, with own API. Because there are no special requirements, it should be easy to port ORTE to many platforms, where UDP/IP stack is implemented.

[compare]

Chapter 2
RTPS version 1.0 and 2.2 comparation

[upgrade]

Chapter 3
Changes needed for compatibility

[test]

Chapter 4
Testing of implementation

[shape]

Chapter 5
Shape for Android

[sec]

Chapter 6
Security for DDS

References

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[OMG:DDS] [2] Object Management Group (OMG). *Data Distribution Service for Real-Time Systems* . 2007 .
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[FEE:ORTE] [4] *ORTE - Open Real-Time Ethernet* .
http://orte.sourceforge.net/ .

Requests for correction

[rfc-1] obrazek