IPR issues update

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1 Document History

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2 List of Acronyms

CA	Consortium Agreement
COTS	Commercial off-the-shelf
GPL	General Public License
IPR	Intellectual Property Rights
MPT	MultiPARTES Project
TDMA	Time Division Multiple Access
TTNoC	Time-Triggered Network-on-Chip
VHDL	Very High Density Logic

3 Executive Summary

This document details the IPR of the MultiPARTES outcomes. In the Consortium Agreement, a general framework of rights for software and hardware developments was established.

Before the Project Kick-Off meeting the IPR issues were discussed and assured in the Consortium Agreement, where the background knowledge of the partners was captured in the Consortium Agreement prior to the Project launch.

During the Project duration the leader of this task monitored and assured the information flew within the Consortium, taking care of the IPR protection. This document updates, as a result of that continuous monitoring, what it was gathered in the Consortium Agreement.

4 Introduction

4.1 Purpose of the document

The purpose of this document is to identify the MultiPARTES project outcomes and detail their Intellectual Property Rights (IPR) provisions.

4.2 Structure of the document

This document is organised as follows:

- Chapter 4 offers the summary and the structure of this document.
- Chapter 5 presents the MultiPARTES outcomes with a short description
- Chapter 6 details the IPR considerations for each outcome
- Chapter 7 elaborates some conclusions

5 MultiPARTES Outcomes

The MultiPARTES outcomes have been classified according the type of result: hardware, software, test suits and demonstrators. The sections below describe the outcomes for each result type.

5.1 Hardware

Several hardware designs have been carried out in the project:

- **Hardware design of COTS solution**. IKERLAN-IK4 with the support of TU WIEN build the final hardware based on the sparcV8 (LEON3 design) introducing interfaces to connect the FPGA with the LEON3 through a PCI Express to the Atom platform based on TTNoC technologies. LEON3 VHDL design was based on the GAISLER distribution licensed as GPL.
- **Hardware design TTNoC bespoke Hardware**: IKERLAN-IK4 with the support of TU WIEN build the final hardware based on the sparcV8 (LEON3 design) introducing local memories and a Distributed Memory Management based on a LEON3 processor. LEON3 VHDL design was based on the GAISLER distribution licensed as GPL.
- **Hardware design based on TDMA:** TU WIEN designed and implemented new policy for the AMBA bus based on TDMA bus arbitration. LEON3 VHDL design was based on the GAISLER distribution licensed as GPL.

5.2 Software

Several software components have been developed in the project:

- **Virtualization Layer (XtratuM for x86 and LEON3 Multicore)**: the virtualization layer has been adapted from previous mono-core versions to multi-core by FENTISS. XtratuM was declared as background technology in the CA.
- **Configuration and deployment tools**: FENTISS has adapted the configuration and deployment tools required to generate the system. These tools are included in the Virtualization Layer distribution and, as XtratuM, were defined as background technology in the CA.
- **GuestOS adaptation** to be executed on top of the virtualization layer have been developed or adapted.
    - MPTAL: The definition of the services to be included in this layer was leaded by UPV and developed by FENTISS. No previous work on this layer was defined.
    - Linux: UPV has adapted the Linux kernel to be executed as partition on top of XtratuM. It is based on the standard Linux distribution and the kernel modification are integrated in the Linux kernel which has a GPL license.

- ORK+: UPM has adapted their previous development (ORK+) to be executed as partition on top of XtratuM. It was declared as background technology by UPM in the CA.
- PartiKle: UPv has adapted their previous development o be executed as partition on top of XtratuM. It was declared as background technology by UPV in the CA.

Modelling tool. In the framework of WP5, a MultiPARTES Modelling tool has been developed. UPM has leaded the development with the support of IKERLAN-IK4 and TRIALOG.

- **Methodology for designing Mixed-Criticality Systems according to IEC-61508**. It is a methodology extension for designing mixed-criticality systems based on a Functional Safety Management (FSM), developed by IKERLAN-IK4 based on the certified IKERLAN-IK4's FSM for IEC-61508 safety systems.

5.3 Test suites

In order to evaluate the developments, several test suites have been developed:

- **Virtualization layer test suite**. Developed by FENTISS to validate the virtualization layer.
- **XtratuM Security test-suite**. Developed by TELETEL jointly with a testing and monitoring tool.
- **Guest OS test-suite**: to validate the OS adaptation, specific third party test-suites or previous available test-suites have been used.

5.4 Demonstrators

In the MultiPARTES project three demonstrators have been developed: video surveillance, wind power and aerospace demonstrators. Their outcomes have been listed below:

- **Video surveillance demonstrator**: Developed by VTools based on background technology owned by VTools
- **Video test-suite**: Developed by VTools to validate the functionalities and performances of the demonstrator.
- **Wind Power demonstrator**: Developed by ALSTOM with the support of IKERLAN-IK4.
- **Wind Power demonstrator test-suite**: Developed by ALSTOM with the support of IKERLAN-IK4 to validate the functionalities and performances of the demonstrator. It includes the safety concept for the wind power mixed-criticality embedded system which is based on multicore partitioning.
- **Aerospace demonstrator**: Adapted by UPM based on the UPMSat2 design with the support of FENTISS.
- **Aerospace demonstrator test-suite**: Developed by UPM and FENTISS to validate the functionalities and performances of the demonstrator.

6 IPRs

Next tables in the following sections detail the different outcomes, IPRs and licenses divided by the type of results.

6.1 Hardware

Hardware developments	Backgound	IPR	License	Comments
Hardware design of COTS solution (IKERLAN-IK4)	No	No	GPL	Based on the Gaisler development. License GPL.
Hardware design TTNoC bespoke Hardware (IKERLAN-IK4)	No	No	GPL	Based on the Gaisler development. License GPL.
Hardware design based on TDMA (TUWien)	No	TU WIEN	GPL	Based on the Gaisler development. License GPL.

6.2 Software

Software developments	Backgound	IPR	License	Comments
XtratuM and configuration and deployment tools	Yes	FENTISS	GPL v2	Based on monocore XtratuM and configuration tools.
MPTAL	No	FENTISS	GPL v2	New development.
GuestOS: PartiKle	Yes	UPV	GPL v2	Adapted to MPT Virtualization layer.
GuestOS: Linux	Yes	UPV	GPL v2	Adapted to MPT Virtualization layer.
GuestOS: ORK+	Yes	UPM	GPL v2	Adapted to MPT Virtualization layer.
MPT Development toolset	Yes	UPM	GPL v2	Based on the toolset development in CHESS project

Methodology for designing Mixed-Criticality Systems According to IEC-61508	Yes	IKERLAN-IK4	Proprietary	Based on IKERLAN-IK4's FSM

6.3 Test suites

Test suites	Backgound	IPR	License	Comments
XtratuM test-suite	Yes	FENTISS	Proprietary	
XtratuM Security test-suite	No	TELETEL	Proprietary	
MTPAL test-suite	No	FENTISS	Proprietary	
MPT abstraction layer conformance test suite	No	TELETEL	Proprietary	
Linux, PartiKle test-suites				Third party development
ORK+ test suite	Yes	UPM	Proprietary	

6.4 Demonstrators

Demonstrators	Backgound	IPR	License	Comments
Video surveillance demonstrator	Yes	VTools	Proprietary	
Video testing suite	No	VTools	Proprietary	
Wind Power demonstrator	Yes	ALSTOM	Proprietary	
Wind Power demonstrator test-suite	No	ALSTOM and IKERLAN-IK4	Proprietary	
Aerospace demonstrator (on-board software)	Yes	UPM	GPL V2	Part of the UPMSat-2 on-board software.
Aerospace demonstrator test-suite (on-board software)	Yes	UPM and FENTISS	GPL V2	Part of the UPMSat-2 on-board software.

7 Conclusions

This document detailed the outcomes of the MultiPARTES project from the point of view of Intellectual Property Rights (IPR) and reviewed the IPRs and licenses of each MultiPARTES component.

8 References

[1] MultiPARTES FP7 project, IST-287702, Consortium Agreement
[2] MultiPARTES FP7 project, IST-287702, D8.7 “Dissemination final report”.