5G Communication with a Heterogeneous, Agile Mobile network in the Pyeongchang Winter Olympic competitioN

Grant agreement n. 723247

Deliverable D7.3
Organization of a Special Session at a key conference

Date of Delivery:	31 May 2017 (Contractual)	31 May 2017 (Actual)
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Associate Editors:	CEA	
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Dissemination Level:	PU	
Security:	Public	
Status:	Final	
Version:	V1.0	
File Name:	5GCHAMPION_D7.3_Final.docx	
Work Package:	WP7	

	Title:	Deliverable D7.3: Organization of a Special Session at a key conference
	Date: 31-05-2017	**Status:** Final
	Security: PU	**Version:** V1.0

Abstract

In the context of its overall dissemination strategy, 5G CHAMPION organizes a Special Session on "*Software Reconfiguration enabling 5G*" at the 25th European Signal Processing Conference (EUSIPCO) which will be held from August 28 to September 2, 2017. This document details why this specific event was chosen for a Special Session how it complements further activities of the consortium.

Index terms

5G, 5G CHAMPION, Dissemination, Regulation, Standardization.

Contents

1 Introduction

5G CHAMPION has given the commitment to organize a Special Session at a key conference. This commitment is fulfilled by organizing the Special Session on "Software Reconfiguration enabling 5G" at the 25th European Signal Processing Conference (EUSIPCO) which will be held from August 28 to September 2, 2017.

This event is complementing further organized events by 5G CHAMPION, including

- International workshop on "*Multi-RAT and Network/Terminal Function Virtualization*", 23 February 2017, Orange Gardens, Châtillon, France, co-organized by Orange, b<>com and INTEL.
- International Workshop on "*Prototyping 5th Generation Cellular Wireless Technology*", co-organized by three projects under the overall leadership of 5G CHAMPION, located in Oulu, Finland:
  - 5G CHAMPION (**5G C**ommunication with a **H**eterogeneous**, A**gile **M**obile network in the **PyeongChang** w**I**nter **O**lympic competio**N**)
  - Flex5Gware: (**Flex**ible and efficient hardware/software platforms for **5G** network elements and devices)
  - 5G-MiEdge (**Mi**llimeter-wave **Edge** cloud as an enabler for **5G** ecosystem)
- International Workshop on "*5G Test-Beds & Trials – Learnings from implementing 5G (5G-Testbed 2017)*", co-organized by two projects under the overall leadership of 5G CHAMPION, located in Singapore:
  - 5G CHAMPION (**5G C**ommunication with a **H**eterogeneous**, A**gile **M**obile network in the **PyeongChang** w**I**nter **O**lympic competio**N**)
  - 5G-MiEdge (**Mi**llimeter-wave **Edge** cloud as an enabler for **5G** ecosystem)
- 2017 IEEE 85th Vehicular Technology Conference: VTC2017-Spring 4–7 June 2017, Sydney, Australia, Industry Track "*5G and Wireless Day*".

With the upper activities, 5G CHAMPION is in the position to ensure world-wide visibility of its research results.

2 5G CHAMPION Events Strategy

5G CHAMPION has chosen its dissemination and events strategy based on the following criteria:

- Coverage of multiple regions, in particular Europe, Asian-Pacific and Americas.
- Dissemination to a diverse audience, including Industrial Stakeholders (R&D, Standardization, Business Development, etc.), Researchers, Administrations, etc.
- Addressing experts in various domains, including physical layer experts, higher layer experts, etc.

5G CHAMPION has managed to meet the upper requirements by a diligent selection of high profile events, as they are outlined in the table below.

Event	**Region / Participation**	**Audience type**	**Technical Expertise of Audience**
International workshop on "*Multi-RAT and Network/Terminal Function Virtualization*", 23 February 2017, Orange Gardens, Châtillon, France	Europe	Industrial representatives (Standardization Experts, Management, etc.), Regulaton Administrations	Physical Layer, Medium-Access Control Layer and higher Layers
Special Session on "*Software Reconfiguration enabling 5G*" at the 25th European Signal Processing Conference (EUSIPCO), Kos Island, Greece, August 28 to September 2, 2017	Europe and some participation of other regions	Academia, technical experts from Industry	Focus on Physical Layer
International Workshop on "*Prototyping 5th Generation Cellular Wireless Technology*", at European Conference on Networks and Communications (EuCNC),Oulu, Finland, 12-15 June 2017	Europe	Academia and Industrial Research	Physical Layer, Medium-Access Control Layer and higher Layers
International Workshop on "*5G Test-Beds & Trials – Learnings from implementing 5G (5G-Testbed 2017)*", IEEE Globecom, 4-8 December 2017, Singapore	Asia, Americas	Academia, technical experts from Industry	Physical Layer, Medium-Access Control Layer
Industry Track "*5G and Wireless Day*", IEEE 85th Vehicular Technology Conference (VTC2017-Spring), 4–7 June 2017, Sydney, Australia	Asia Pacific	Academia, technical experts from Industry	Physical Layer, Medium-Access Control Layer and higher Layers

From the upper summary, it is obvious that 5G CHAMPION fulfills its dissemination strategy in particular in terms of event excellence, diversity of geographic representation and expertise of participants.

3 Special Session on "*Software Reconfiguration enabling 5G*"

The accepted Special Session submission "*Software Reconfiguration enabling 5G*" at the 25th European Signal Processing Conference (EUSIPCO), to be held from August 28 to September 2, 2017, is summarized in the sequel.

Special Session

Software Reconfiguration enabling 5G

28-August – 2-September 2017, Kos Island, Greece in conjunction with Eusipco'17

Scope and Objectives

The "Radio Equipment Directive (RED)" was recently published and replaces the previous "Radio and Telecommunication Terminal Equipment (R&TTE) Directive" which was in force since 1999. The RED creates a new regulation framework in Europe and includes in particular clear provisions in order to enable the introduction of software reconfiguration technology in the Single European Market. This Special Session will gather cross-regional experts, including Korean and European thought leaders, in order to address state of the art technological solutions enabling software reconfiguration in wireless radio equipment. Furthermore, challenges in the field of security and certification will be discussed in order to provide the audience with a holistic picture on the multi-disciplinary challenge.

This proposal is supported by the 5G CHAMPION consortium which is working towards a real-field PoC of 5G Networks capabilities at Peyong Olymic games in 2018.

Program

Adaptive automotive communications solutions of 10 years lifetime enabled by ETSI RRS Software Reconfiguration technology; KIM Kyunghoon (Hanyang University, Korea), AHN Heungseop (Hanyang University, Korea), HAUSTEIN Thomas (HHI, Germany), MUECK Markus (INTEL, Germany), FRASCOLLA Valerio (INTEL, Germany)
Highly efficient representation of reconfigurable code based on a Radio Virtual Machine: Optimization to any target platform; IVANOV Vladimir (State University of Aerospace Instrumentation, Russia), JIN Yong (Hanyang University), DESTINO Guiseppe (University of Oulu, Finland), MUECK Markus (INTEL, Germany), FRASCOLLA Valerio (INTEL, Germany)
An SDN/NFV evolved packet core approach enabling agile management of core network functionality and services; CHOI TaeSang (ETRI, Korea), KIM TaeYeon (ETRI, Korea), CLEMENTE Antonio (CEA, France)
Reconfiguration of 5G radio interface for positioning; SALORANTA Jani and DESTINO Giuseppe (University of Oulu, Finland)
Radio Equipment Directive – A novel software reconfiguration framework; MUECK Markus (INTEL, Germany), LEGUTKO Christoph (INTEL, Germany), CALVANESE STRINATI Emilio (CEA, France), CLEMENTE Antonio (CEA, France), BENDER Paul (Bundesnetzagentur (Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway), Germany), FRASCOLLA Valerio (INTEL, Germany)

A summary of the papers is given below:

- Adaptive automotive communications solutions of 10 years lifetime enabled by ETSI RRS Software Reconfiguration technology
  - **Short Abstract**: ETSI RRS has recently published a set of standards for Client side Software Reconfiguration covering the technical, security and regulation vectors. It will be shown how the basic features for downloading and installation of software can be applied to a vehicular context. Furthermore, a

novel highly efficient way of introducing generic reconfigurable code through a Radio Virtual Machine based representation will be considered for its applicability to the automotive context.

- Highly efficient representation of reconfigurable code based on a Radio Virtual Machine: Optimization to any target platform
    - **Short Abstract**: This paper introduces a novel way of adapting a Radio Virtual Machine (RVM) based code representation to any target platform. The approach indeed consists in reconstructing a generic RVM based code representation to the available resources of a target platform in order to enable efficient back-end compilation. Finally, highly efficient code is generated which is substantially superior to a middle-ware based code execution approach.
- An SDN/NFV evolved packet core approach enabling agile management of core network functionality and services
    - **Short Abstract**: Virtualization of major parts of the network in combination with Software Defined Networking are a clear trend in 5G Communications. This paper will discuss novel solutions combining SDN and NFV approach in order to enable an agile management of the infrastructure core network functionalities and related services.
- Reconfiguration of 5G radio interface for positioning
    - **Short Abstract**: In addition to high data-rate, mmWave technology has great potential to provide extremely high localization accuracy. In this paper, we outline the benefits of this technology for positioning and their main applications, which are no longer confined to services but also to improve communication. We shall focus on the reconfiguration mechanisms of the radio interface in order to achieve optimum trade-off with data communication.
- Radio Equipment Directive – A novel software reconfiguration framework
    - **Short Abstract**: The European Commission has recently replaced the R&TTE Directive – which was in force since 1999 – by the novel Radio Equipment Directive (RED). The RED represents the basic regulation framework for wireless equipment and includes novel provisions for software reconfigurability. This paper summarizes the novel rules and provides solutions which will enable manufacturers to meet technical, security and certification requirements for 3rd party software reconfigurable equipment.

4 Conclusion

As a conclusion, 5G CHAMPION has fulfilled the organization of a Special Session at a key conference in alignment to the overall 5G CHAMPION dissemination strategy. 5G CHAMPION has indeed been highly successful in winning Special Sessions and Workshops across the globe which help to disseminate the project's vision on 5G in all regions. Until the end of the project, the implementation of these events will be executed.