Cognitive Radio Experimentation World

Project Deliverable D8.3
Standardization and Regulation Report

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Abstract: This deliverable reports on the standardization and regulation efforts undertaken by the CREW project so far. It also includes the plans for the third project year.

Keywords: regulation, standardization, cognitive radio, experimentation.

REVISION HISTORY

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0.0	03/07/2012	Alejandro SANCHEZ (TCS), Somsai THAO (TCS)	Initial draft from CREW documents template
0.1	05/07/2012	Alejandro SANCHEZ (TCS), Somsai THAO (TCS)	Annex modified with project description as previous content was non publishable internal WInnF procedures
0.2	17/09/2012	Mihael Mohorcic (JSI), Tomaz Javornik (JSI), Sofie Pollin (IMEC), Stefan Bouckaert (IBBT)	Integration of various contributions received over the past weeks.
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2.2	26/09/2012	Ingrid Moerman (IBBT)	Final draft
2.3	27/09/2012	Mihael Mohorcic (JSI), Ingrid Moerman (IBBT)	Final update and editing

Executive Summary

This deliverable reports on the activities related to standardization and regulation that were undertaken by the CREW project so far. Several CREW partners are involved in relevant standardization groups, such as the Wireless Innovation Forum (WInnF), IEEE 1900.6, IEEE 1900.7, IEEE 802.11 and ETSI. In addition there exist good contacts with regulators, such as BIPT/IBPT in Belgium, ComReg in Ireland, APEK in Slovenia and via COST Actions.

List of Acronyms and Abbreviations

3GPP	3rd Generation Partnership Project
APEK	Post and Electronic Communications Agency
API	Application Programming Interface
ComReg	Irish Communications Regulator
COST	Commercial Off The Self
COST	European Cooperation in Science and Technology
CR	Cognitive Radio
CTVR	Centre for Telecommunications Value-chain Research (TCD is a member of CTVR)
DoW	Description of Work
Dx.y	(CREW) Deliverable x.y
DySPAN	Dynamic Spectrum Access Networks
ERP	Effective Radiated Power
FIRE	Future Internet Research & Experimentation
FuNeMS	Future Network and Mobile Summit
LTE	Long Term Evolution
LTE-A	Long Term Evolution – Advanced
MAC	Medium Access Control
Ofcom	Office of Communications, UK
PCAST	President's Council of Advisors on Science and Technology
PHY	Physical Layer
REM	Radio Environment Map
RF	Radio Frequency
ROC	Receiver Operating Characteristics
SDR	Software Defined Radio
STSM	Short Term Scientific Mission
TERRA	Techno-Economic Regulatory framework for Radio spectrum Access for CR/SDR
TVWS	TV White Space
UHD	USRP Hardware Driver
UHF	Ultra High Frequency
USRP	Universal Software Radio Peripheral
WInnF	Wireless Innovation Forum

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1 Introduction

1.1 Scope

The CREW project is a FIRE (Future Internet Research and Experimentation) infrastructure project, targeted at creating future Internet facilities where cognitive radio and cognitive networking solutions can move from a conceptual or theoretical phase to a practical phase. The possibility to experimentally validate cognitive radio and cognitive networking algorithms is crucial for several reasons, of which the most important one in the context of this deliverable is the following: To make informed decisions on spectrum policies (e.g. database via sensing approaches), regulators need to identify the real-life behaviour of cognitive solutions. To be able to identify the real-life behaviour of these solutions, experimenters need access to well-built experimentation facilities such as CREW.

The CREW project does not aim to only support experiments that fully comply with existing standards, but from a scientific point of view, it is also important to keep all experimentation options open. However, it is interesting to follow the standardization activities in various bodies, to be able to, where applicable, contribute to standardization by attending events and meetings, and disseminate relevant information and results. The goal of this deliverable is to report on these CREW activities related to standardization and regulation.

This deliverable is structured as follows: Section 2 discusses the past activities related to standardization, while Section 3 discusses the past activities related to regulation. Finally, Section 4 presents the plans for future activities and concludes the document.

1.2 Document purpose and intended audience

This deliverable is primarily meant as a report towards the European Commission. However, it is also relevant for those readers interested in the current CREW activities related to standardization and regulation.

2 Standardization activities

2.1 Activities within the Wireless Innovation Forum (WInnF)

The CREW consortium has been very active and deeply involved within the Wireless Innovation Forum. As it was to be expected the development undertaken by CREW regarding the Transceiver Facility API specification is seen as major activity by the corresponding WInnF working group (The Transceiver Subsystem Interface Task Group, TSI-TG). The implementation of this open specification on top of a low cost COST platform as USRP2, is moving forward the ultimate goal of the working group of making this API an open standard in the SDR domain.

Within Workpackage 3 the implementation of the Transceiver API has been carried out. This implementation now represents a common reference base facilitating the Transceiver API understanding and dissemination thanks to a source code base for a widely available and used platform as Ettus Research USRP2 board.

Four New Projects Initiated
by Wireless Innovation Forum Members

WIRELESS INNOVATION FORUM

Projects will advance and support Transceiver Interface and the SCA standards

For Immediate Release

Washington, DC, 28 June 2012 – The Wireless Innovation Forum (www.WirelessInnovation.org), a non-profit international industry association dedicated to driving the future of radio communications and systems worldwide, announced today the approval of four new projects by Wireless Innovation Forum members.

CORBA Zero-Copy Enhancement is the new project of the Forum's SCA Next Work Group, chaired by Terry Anderson (ITT Exelis [NYSE: XLS]). This project is being developed for SDR and Embedded Domains developers who need to move data efficiently with increased throughput and reduced latency while addressing Size, Weight and Power (SWAP) and battery technical challenges. The project will produce an Object Management Group (OMG) CORBA Zero Copy Request For Comment (RFC) specification, which captures the CORBA Zero Copy Enhancements that provides a standard set of CORBA specification(s) and CORBA IDL to language mappings (e.g., C, CPP, etc.) for ORB vendors to support CORBA zero copy, which provides application portability and backwards capability to current CORBA language mappings.

The SCA API Work Group, also chaired by Mr. Anderson and vice chaired by Fabio Casolino (Selex Communications [ISE: IT:FNC]), had two new projects approved:

- **API Requirements Specification**: This specification is being produced for API specification writers who need a set of requirements leading to complete and fully specified APIs. The specification will provide requirements for what API specifications must contain to fully define an API, and unlike the many existing API specifications used as examples, this product will lead to more fully specified APIs that will make implementing products (platform devices and services and applications) more portable.
- **API enhancement for Audio Device API:** This project is being undertaken for SCA product implementers, including platform and application (waveform) developers, who need a more complete specification of an Audio Device API. The project will produce a more precise specification for the API, meeting the requirements published by WINNF.

The Transceiver System Interface Task Group (TSI-TG), chaired by Eric Nicollet (Thales Communications [PAR: FR:HO]), will begin work on a new project on **Fast Prototyping With WInnF Transceiver Facility Implementation**. This project is being undertaken for providers of SDR software applications (waveforms, sensing modules, ...) running in SDR products who seek a cost-efficient method for fast-prototyping the SDR software application. The project will enable fast-prototyping of SDR software applications thanks to (i) open source upgrade of COTS fast-prototyping transceiver solutions to WInnF Transceiver Facility and (ii) preliminary design activities for fast-prototyping of waveform applications using the upgraded platform. What this means is that unlike the existing situation where the a SDR software application fast-prototyped and validated under PC-based environment are then requiring a significant further rework when being ported and integrated into the target commercial SDR platform, this project will enable SDR software applications to be ready for faster porting into WInnF Transceiver Facility compliant radio equipment, thanks to the abstraction of the Transceiver implementation architecture offered by WInnF Transceiver Facility.

Forum Work Groups, Task Groups and Special Interest Groups met to advance these and others projects at the **Forum's 72nd Working Meeting**, held this week, 25-27 June, in Brussels, Belgium. For more information on the meeting, visit http://groups.WInnForum.org/72nd_WM_Agenda.

Figure 1: Official WInnF announcement for the Transceiver API on USRP2.

Thanks to this fact, i.e. the availability of a reference code, the WInnF working group decided on June 28 to launch a project dealing with this issue. Figure 1 displays the WInnF official announcement

This action is an important step by CREW in the standardization direction since it helps the promotion of the Transceiver API and moves close the standardization the document is aiming at. The official project document is provided in annex 1.

Also within the Wireless Innovation Forum, TCD has been active within the Commercial Baseband Processing Technologies Work Group where the focus has been on the Commercial Baseband Open Source Framework Project. The aim of this project is to develop an open-source commercial SDR baseband framework and design methodology for Physical (PHY) and Medium Access Control (MAC) layers with an initial focus on 3GPP LTE and LTE-advanced. In addition, TCD participates in the Regulatory Committee, which most recently approved and commented on the US PCAST report on “Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth" [1].

2.2 IEEE 1900.6 related standardization activities

The IEEE 1900.6 standard [2] was published in April 2011 and is defining interfaces and data structures for exchanging spectrum sensing related information. IMEC was an active partner and member of the IEEE 1900.6 Working Group at the time the draft standard was submitted for approval to the IEEE-SA, and ensured that the interfaces for exchanging spectrum sensing related information were sufficiently broad to allow the sensing by means of the IMEC advanced sensing engine. As such it was selected as the most suitable for the needs of CREW project (see also the “Common Data Collection / Storage Methodology Design" which is part of CREW Task 3.3), although requiring some extensions of data structures [3] to ensure its usefulness for heterogeneous sensing and link with the existing testbed infrastructures. Also TUB has been following IEEE 1900.6 actively, and among other things also participated to the IEEE 1900.6 work meeting in Berlin, which was organized by the IEEE DySPAN Standards Committee from September 26th – 30th, 2011.

Additionally, an example of such extension to the draft standard for describing an experiment in a CREW testbed was presented at the COST Action IC0902 workshop in Barcelona [4] by JSI, and was considered interesting for the consideration of the DySPAN-P1900.6 Working Group on Spectrum Sensing in Advanced Radio Systems [5]. This Working Group is now concerned with drafting the amendment 1900.6a to the baseline standard providing specifications of procedures, protocols and message format for the exchange of sensing related data, control data and configuration data between spectrum sensors and their clients, with the aim of allowing the integration of 1900.6 based distributed sensing systems into existing and future dynamic spectrum access radio communication systems.

Given the official status of the IEEE 1900.6 standardization process, the nature and extent of possible input from CREW and the fact that CREW partners are no longer active members of the DySPAN-P1900.6 Working Group, the only possible approach towards IEEE 1900.6 is to present at one of the group's meetings a contribution such as [2], proposing the creation of a “Recommended Practice” standard within the 1900.6 Working Group on testing / configuration of sensors using the 1900.6 system. This “Recommended Practice” standard could utilize and learn from aspects of the CREW experiment specification model (and any other similar), as has been presented in the 2nd COST IC0902 Workshop. Such action is currently planned in agreement with one of the Working Group members for the 1900.6 meeting in Beijing, China, 9-11 October 2012 via remote presentation.

2.3 IEEE 1900.7 related standardization activities

At the moment there is no active participation foreseen from the JSI side to the DySPAN 1900.7 Working Group on Radio Interface for White Space Dynamic Spectrum Access Radio Systems Supporting Fixed and Mobile Operation, yet we are following the development of the standard and should there be an opportunity to contribute we will try to take a similar action as in the case of IEEE

1900.6. Also IMEC is remotely monitoring the progress of the Working Groups, to ensure that no opportunities are missed.

2.4 IEEE 802.11 related standardization activities

IMEC participates to the IEEE 802 standardization activities and meetings and is a voting member. IMEC mostly follows IEEE 802.11ac/ad/af/ah tries to monitor IEEE 802.11 (WG11) and IEEE 802.15 (WG15). There is no "cognitive radio" development within WG11 or WG15. Within WG11, 11af is the closest to cognitive radio since it is about reusing TV White Spaces with an IEEE 802.11ac inspired PHY and MAC. The main features of an IEEE 802.11af system are now being discussed, and a draft is being circulated (parameters not yet approved). IMEC is implementing the PHY for IEEE 802.11af (cf. Demo planned at DySPAN 2012 [6]) to study its performance and sensitivity to interference from adjacent TV bands.

2.5 Additional standardization activities and informal contacts (ETSI)

In addition to the above activities, CREW members have also been attending standardization sessions at international events. Although these activities did so far not lead to formal contacts or formal contributions to standardization, it is important to keep up-to-date with standardization efforts.

For example, on October 27 at the FIRE week in Poznan, CREW members attended and contributed to the FIRE session "The use of formal testing methods in FIRE" [7], where Jorgen Friis of ETSI was also a speaker, talking about the "Use of interoperability best practices in test activities related to research". From these informal contacts with Jorgen Friis, two supporting bodies of ETSI for interoperability were identified, namely the technical committee MTS (Methods for Testing and Specification), and the Centre for Testing and interoperability.

3 Regulation activities

3.1 Regulation activities on the national level in Slovenia

JSI was invited by the Slovene regulator APEK (Post and Electronic Communications Agency of the Republic of Slovenia) to participate in the recently started project on the utilization of the RF spectrum for the electronic communications services. Thus Dr Tomaz Javornik from the Department of Communication Systems, JSI, has become an active member of APEK external advisory group, responsible primarily for white areas coverage (their identification and possibility of shared spectrum use), internetworking between base stations and joint use of infrastructure.

JSI also reported to APEK the need to occasionally transmit radio signals in the UHF band with specified geographical area and provisional transmitting profile (up to 100mW transmit power, 100-200kHz bandwidth, frequency band 470-700 MHz) and received an answer that these requirements comply with the Regulation on radio frequencies that can be used without explicit frequency allocation. Effectively this means that it is allowed for trials and experimentation in the LOG-a-TEC testbed to transmit signals of up to 50 mW ERP in any of the channels in the UHF band not used for TV broadcast.

3.2 Link with regulation activities on the national level in Belgium

IMEC is participating in the 'Spectrum Monitoring Task Force' started by the Belgian national regulator BIPT/IBPT to face the spectrum challenges of the 21st century. A set of concrete topics of interest related to spectrum monitoring (for the regulator) were identified, showing regulator interest in cognitive radio and spectrum monitoring techniques beyond the traditional interests related to opportunistic spectrum access or spectrum licensing. Improved spectrum monitoring is needed to ensure optimal use of spectrum, as well as avoid interference between new and old technologies. Also, RF exposure should meet certain limits and distributed monitoring solutions are needed to allow monitoring if the limits are not exceeded.

3.3 Link with Irish and UK Communications Regulator

The CREW team in Dublin has been engaged with both the Irish and UK regulators in the past quarter. Linda Doyle sits on the Ofcom Spectrum Advisory Board and therefore interacts with Ofcom regularly and has the opportunity to discuss spectrum policy. Ofcom is an evidence-based policy maker and therefore they tend to be interested in keeping abreast with advancements in the field, especially in cognitive technologies.

The engagement with the Irish regulator ComReg has been increasing since the beginning of the CREW project. From our perspective we believe that Ireland is ideally situated to be a Spectrum Playground – a place where more advanced and futuristic wireless experimentation could take place. It is an island, has a low population and spectrum is not over-crowded. However regulators by their nature are cautious. We have been engaged in much conversation with ComReg in order to push forward this approach. To date for example TV White space trials have not even taken place here. With this in mind we have organised an event, called "Filling the White Spaces", to be held on Sept 26th in the Science Gallery in Trinity. The purpose of the event is to inform an Irish Audience of the actual test and trials that have taken place in the UK, USA, Singapore and Finland and to seek out an opportunity for Ireland. During this event we have in fact an opportunity to showcase both the outcomes from FP7 CREW and FP7 CogEU together. The CREW ideas and opportunities resonate very well with the whole focus on test and trial. While the CogEU project has a specific focus on TV White Space, the event will be attended by a wide range of industry (Dell, Intel, Ericsson, e-Net, Imagine, ESB, HEAnet, Vodafone, Three, O2, BSkyB, Magnet, UPC, Neul, Adaptrum, Microsoft, Google, Spectrum Bridge, BT, Benetel, Vilicom and others) as well as ComReg and officials from the Department of Communications in Ireland. In parallel with this we have arranged a meeting with the

advisor to the Minister for Communications in the hope that we can further the ideas around the wireless testbed concept as well as push for more dynamic approaches to spectrum management.

Further on this, as stated in D3.2, TCD has recently received a Test and Trial license, for TV-band transmission, from ComReg, starting on 10/08/2012 and valid for one year. The license is for 694-718 MHz, with channel bandwidth of 4 MHz and maximum ERP of −10 dBW.

3.4 Link with COST Action

Members of CREW are also actively involved in relevant COST actions. In the management committee of COST Action IC0902 Prof. Luiz DaSilva (TCD) represents Ireland and Dr. Mihael Mohorcic of JSI represents Slovenia; Prof. DaSilva is also the STSM (Short Term Scientific Mission) manager for that COST Action. Another member of staff at CTVR, Dr. Keith Nolan, represents Ireland in the management committee of COST Action IC0905, while Dr. Thomaz Javornik of JSI represents Slovenia in the COST Action IC1004.

In October 2011 a member of JSI, Zoltan Padrah, also took the opportunity of STSM and visited University of Ss. Cyril and Methodius, Faculty of Electrical Engineering and Information Technologies in Skopje, Former Yugoslav Republic of Macedonia, where he carried out calibration measurements and spectrum sensing with VESNA platform in a heterogeneous spectrum sensing environment for REM construction

CTVR has hosted two STSMs, one funded by IC0902 (a student from University of Aalborg, Denmark) and one by TERRA (a researcher from EIT+, Poland), with specific objectives of using the CTVR cognitive radio testbed that is part of CREW. Both STSMs involved testbed experiments that have been disseminated in public demonstrations (e.g. at FuNeMS 2012 and at the Annual Workshop of COST Action IC0902 in Barcelona, 2011). We have also received requests to host additional two students on COST Action funded STSMs in the second half of 2012.

Finally, CREW capabilities have been disseminated at meetings of COST Action IC0902.

4 Conclusion and future plans

Although not the main scope of the CREW project, the list above (WInnF forum, IEEE 1900.6, etc.) shows how different CREW members are following and involved in standardization activities, and how good relations with the regulators exist.

For the future, CREW plans to keep following the relevant standardization bodies and maintain contacts with regulators. A special point of attention for the future is to spend more attention to the relevant ETSI standardization activities; although two supporting bodies have been identified and ETSI websites are used to keep us informed about ongoing activities, we plan to explore the opportunities for active participation in the identified ETSI supporting. While the focus in Year 1 and Year 2 was to develop, extend and optimize federation tool and methods, these should be sufficient mature in Year 3 to allow more active participation in standardization bodies.

5 References

[1] PCAST, "Realizing the Full Potential of Government-held Spectrum to Spur Economic Growth", available online: www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf.

[2] IEEE Standard 1900.6-2011, IEEE Standard for Spectrum Sensing Interfaces and Data Structures for Dynamic Spectrum Access and other Advanced Radio Communication Systems, Institute of Electrical and Electronics Engineers, April 22, 2011, 168 pages.

[3] D. Finn, J. Tallon, L. DaSilva, J. Vanhie - Van Gerwen, S. Bouckaert, I. Moerman, C. Heller, A. Sanchez, D. Depierre, S. Pollin, P. Van Wesemael, J. Hauer, D. Willkomm, M. Chwalisz, N. Michailow, C. Fortuna, Z. Padrah, M. Mihelin, Basic operational platform, CREW Project Deliverable D3.1, (CREW, FP7-ICT-2009-5-258301), September 30, 2011.

[4] C. Fortuna, M. Mihelin, Z. Padrah, and O. Holland, "A Common Data Format for Spectrum Sensing Information", 2nd COST IC0902 Workshop, Castelldefels, Spain, 10/2011.

[5] Working Group DYSPAN-P1900.6 - Spectrum Sensing in Advanced Radio Systems, http://grouper.ieee.org/groups/dyspan/6/index.htm.

[6] Van Wesemael, P., S. Pollin, M. Desmet, and A. Dejonghe, "Interference Robust SDR FE receiver", IEEE Symposia on New Frontiers in Dynamic Spectrum Access Networks (DySPAN - demo track), Bellevue, USA, 10/2012

[7] Future Internet Week Poznan – The use of formal testing methods. Presentations available online http://www.week.fi-poznan.eu/online/?view=session&session_id=150.

[8] E. Nicollet, S. Pothin and A. Sanchez, "Transceiver Facility Specification", Wireless Innovation Forum, 2 February 2009, "SDRF-08-S-0008-V1_0_0_Transceiver_Facility_Specification.pdf". [Online]. Available: "http://groups.winnforum.org/p/cm/ld/fid=85".

Annex I: Official WInnF project document

This form is used to describe a project for submissions to the Forum's Project Approval Committee. *Please fill in and submit to pac@lists.winnforum.org.*

Project Name	**Fast-prototyping with WInnF Transceiver Facility Implementation**
Leader	**Eric NICOLLET (THALES Communications & Security)**
Committee	**TC-SDR**
Group within Committee	**Transceiver Work Group**
Project Number	**PAC-2012-001**
Contact	**Somsaï THAO (THALES Communications & Security)**
Description revision	**V1 – From approved Project Proposal**

AI.1 Positioning

Please provide a positioning statement for the project's output. This statement will be used to define the project and promote it throughout the advanced wireless community.

For providers of SDR software applications (waveforms, sensing modules…) running into SDR products,

Who seek cost-efficient solution for fast-prototyping of their SDR software applications,

The project "Fast-prototyping with WInnF Transceiver Facility Implementation" is a WInnF project

That aims to enable fast-prototyping of SDR software applications thanks to (i) open source upgrade of COTS fast-prototyping transceiver solutions to WInnF Transceiver Facility, (ii) preliminary design activities for fast-prototyping of waveform applications using the upgraded platform.

Unlike existing situation where the a SDR software application fast-prototyped and validated under PC-based environment are then requiring a significant further rework when being ported and integrated into the target commercial SDR platform,

This project will enable SDR software applications to be ready for faster porting into WInnF Transceiver Facility compliant radio equipments, thanks to the abstraction of the Transceiver implementation architecture offered by WInnF Transceiver Facility.

A1.2 Project Scope

The project is focused on emergence of fast-prototyping solutions complying with WInnF Transceiver Facility, with the following figure describing what is understood by fast-prototyping:

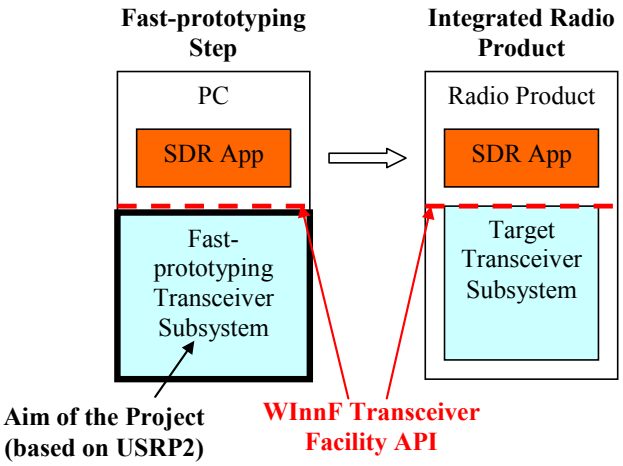

Figure 2: Vision of fast-prototyping based in WInnF Transceiver API.

The version of the WInnF Transceiver Facility to be compliant with is V1.0.0 (ref. [8]: SDRF-08-S-0008-V1.0.0, http://groups.winnforum.org/d/do/1554) (hereinafter called "*the Facility*").

The project is structured around a number of technical activities described in the sequel.

Technical Activity 1 – Open source upgrade of USRP2 to WInnF Transceiver Facility

This activity consists in upgrading the USRP2 transceiver boards from Ettus Research[1] thanks to development of an open source software, the "Façade", that will make, in conjunction with a USRP2 board and its UHD driver, a Transceiver Subsystem compliant with the Transceiver Facility specification, as depicted in the following figure:

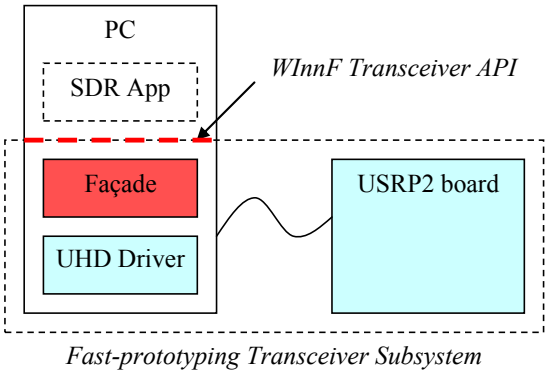

Figure 3: Implementation of the WInnF Transceiver API on top of USRP2.

While the main software development will aim at the implementation of the Façade, evolutions to the UHD will be introduced if required.

The Façade will be available solely requesting that WInnF project and contributors will be referenced by any user of the delivered software.

[1] Ref: https://www.ettus.com/product/category/USRP_Networked_Series

The UHD driver will be used under the terms of Ettus Research binary license[2], that brings no restriction to the licensing of the Façade.

Technical Activity 2 – Preliminary design for Waveforms fast-prototyping

This activity will achieve preliminary design tasks for fast-prototyping of a number of waveforms, assuming usage of the solution prepared by Technical Activity 1.

The set of targeted waveforms will be based on contributors background, AM, FM, and P25 waveforms being planned for first consideration.

The system design activities will at least work on definition of the Configuration Profiles required to support the considered waveform.

NB: this activity will not conduct any software development or integration.

Technical Activity 3 – Report Writing

A WInnF report "Final report on Fast-prototyping with WInnF Transceiver Facility Implementation" will be generated as a final work product of the project.

Applied and recommended Change Proposals to Facility V1 will be recorded in this report.

A1.3 Project Plan

Committed contributors and the organization each represents. Note: Participation by non-members must be in accordance with Forum Policy 014 available at: http://www.wirelessinnovation.org/page/Policies_and_Procedures	WInnF Members: Eric Nicollet (leader - THALES) Alejandro Sanchez (THALES) Matt Ettus (Ettus Research) Steve Bernier (CRC) Eberhard Kölble (THALES) Non-member organisations David Hagood (Aeroflex)
Interim milestones (Date(s) and description(s))	TA1 – Open source upgrade of USPR2 Draft façade: **July 2012** Final façade: **September 2012** TA2 – Preliminary design for WF fast-prototyping Drafts results: **July 2012** Final results: **September 2012**

[2] Ref : http://ettus.com/license

	TA3 Report Writing: **October 2012**
Group ballot date	**October 2012** (after Melbourne, FA meeting)
Committee ballot date	**November 2012**
Plenary ballot date	**WInnComm (January 2013)**
Does this project have the potential to create a work product that contains Intellectual Property?	**No.** Licensing of the developed open source software will namely ensure this.
Does this project have the potential to encroach upon information that is restricted or controlled by national export regulations?	**No.**
Forum resources required	Source code management capability Teleconference service Meeting space at working meetings Email reflectors Document repository

A1.4 Interactions with other groups inside or outside the Forum

This project overlaps with another group's scope.	**No.**
Success depends on output from another group.	**No.**
Results of this project are a critical input to another group.	**No.** Can be of interest for BB processing group activities.