

Integrated Project

ABSOLUTE - Aerial Base Stations with Opportunistic Links for Unexpected & Temporary Events

Contract No. 318632

Report on Dissemination Activities

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Abstract

This document reports on the dissemination activities during the first year of the ABSOLUTE project. It also describes how the knowledge and results have been exchanged among the partners, with other relevant EU projects, and with the wide scientific community and with standardisation bodies and other fora.

Keywords

Dissemination, conference, journal, public demonstration, stakeholder events, workshop

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Executive summary

This document provides an overview of the dissemination activities within the first year (Month 1-12) of the ABSOLUTE project. It describes how the results and knowledge obtained in the project have been exchanged among the partners of the project, with other European projects, with the scientific community and with standardisation bodies and other fora.

In the first year of the project, a dissemination action plan has been put in place for the project (discussed in the deliverable D8.1.1), to ensure the widest possible outreach of the project results to the scientific community and the relevant stakeholders of interest for the ABSOLUTE system and developments. A frequently updated website is the main vehicle of the dissemination plan, with other dissemination instruments, including technical workshops, presence and involvement at EU events, liaison with relevant projects, etc. As part of the dissemination plan, during the first year, the project organized a technical workshop as part of the IEEE CAMAD conference, and also organized a panel at the FuNEMS 2013 conference. Several other dissemination actions were carried out during the first year mainly at scientific events, through organization of special sessions, invited talks, presentations etc. The document will summarize the dissemination activities and major results during the first reporting period.

Within the WP8, a standardisation strategy and plan was also developed, mainly considering the technical innovations in the project. Several aspects were considered in deciding on a mutually agreed standardisation plan (reported in D8.1.1 [2]), which will be updated during the course of the project, mainly taking into account the activities of the selected SDOs (3GPP, ETSI, IEEE) and opportunities that are coming up within these standards bodies and working groups. Furthermore, a close monitoring of the regulatory aspects were also performed with relevant feedback acquired on possible PPDR spectrum regulations in Europe. Such information has been provided to the R&D WPs for deciding on specific parameters useful for system design and other technical parameters. In this document, we will also summarize the standardisation related activities and progress achieved so far within the project.

1 Introduction

WP8 coordinates the dissemination and exploitation activities of the ABSOLUTE project, and the work is organized in five tasks. The objective of dissemination activity (Task 8.1) is to create a wider impact with ABSOLUTE results and technological solutions. Standardization activities (Task 8.2) and regulatory inputs (Task 8.3) are used as tools to expand the impact beyond scientific results, into the industrial community and the regulatory domain. To prepare a commercialization and exploitation framework (Task 8.5), the project also studies new business models that can leverage ABSOLUTE framework and usage models (Task 8.4).

In summary, the dissemination objectives in WP8 are in the following:

- Prepare the dissemination framework for the project, through a comprehensive dissemination plan
- Outline and identify potential standardisation opportunities for ABSOLUTE
- Acquire initial insights and feedback from the regulatory bodies in Europe regarding PPDR/PSC communications
- Follow relevant projects, fora, initiatives and organizations for potential cooperation and liaison opportunities
- Coordinate the dissemination of scientific results
- Organize International workshop discussing advances in Public Safety Communications
- Manage public information dissemination of the project through the ABSOLUTE website

In this dissemination activity report, we mainly update the activities that were carried out within the framework of the two tasks, T8.1 and T8.2.

T8.1 Communication, Dissemination and Training

The main focus of the task is in managing the dissemination and communication activities of the project. Being an exploratory work with potential high impact within the public safety and security domain, dissemination has been an important emphasis for ABSOLUTE, and a dissemination action plan was agreed upon with all the project partners. The dissemination and communication action plan covered eight major areas of activities (which is reported in the deliverable, D8.1.1), including a) publication of scientific results b) ABSOLUTE project workshops and special sessions at conferences/events discussing advances in public safety communications c) presentations and seminars at EU-based events d) participation and strong integration within EC activities, and possible liaison with concurrent projects e) cooperation and liaison with industry fora of relevance f) web presence and communication g) press releases and newsletters and h) interaction and communication with External Advisory Board.

In terms of scientific publications, during the first year of the project, the partners achieved 30 accepted scientific publications, which included 2 journal articles. A further set of 8 articles are currently under review or awaiting acceptance decisions. It is important to note that two of the articles that were presented at PSATS 2013 Conference and ISWCS 2013 conference, were awarded with the best paper award. This is considered as a significant achievement for the project during such an early stage of activity. The project organized its first international workshop (IEEE ETPSC Workshop on Emerging Trends in PSC) co-located with the IEEE CAMAD 2013 conference, at Berlin, during 27 September 2013. The workshop was a well attended event, which included interesting keynote speeches from Prof. Christian Wietfeld (Technical University Dortmund) who provided an interesting talk about “Aerial Ad-Hoc Network Provisioning: Design challenges and Solution Approaches”, and

Mr. Matthew Baker (Alcatel Lucent, 3GPP RAN Chairman) who gave a talk about the “3GPP Programme to provide integrated Public Safety Communications through LTE”. The program also featured 3 invited talks from Prof. Fumiuki Adachi, Prof. Katsumi Iwatsuki and Prof. Nei Kato, all from Japan, who discussed in detail, the progress and perspectives of emergency and resilient communications initiatives in Japan. The workshop also featured an interesting panel discussion about the recent advances in public safety communications and relevant technological aspects. ABSOLUTE project also organized a panel session on Public Safety Future Networks, at the FuNEMS conference, in Lisbon, during July 2013. The panel session was chaired by Ms. Isabelle Bucaille, the ABSOLUTE project coordinator. The panel session featured invitees from ECO (Mr. Thomas Weber), BAPCO (Mr. Jim Strother) and from Waseda University, Japan (Prof. Shigeru Shimamoto). The panel session was well attended and well perceived by the conference organizers and the EU commission alike.

The project has been active within the RAS cluster with participation to both the Working Groups of the cluster, on PHY layer advances for 5G (WG#1) and novel network architectures for 5G (WG#2). Presentations of the project were given at the EC concertation meetings, during October 2012 (10th Future Networks Cluster meeting) where a general overview of the project was provided, and February 2013 (11th Future Networks Cluster meeting), during which a presentation of the standardization plan of the project was presented. The project partners were active in disseminating the information about the project at various other events in the form of invited talks, session organizations, panel participation etc.

Various press releases and articles were published about the ABSOLUTE project both in perspectives and about its architecture and potential impact for the public safety community. Lastly the project website is being actively used to disseminate the project progress and results, and the analytics tool demonstrates that during a period of five months between June-October 2013, there have been more than 1500 unique visits to the project website, which shows the improving popularity of the website, and its contents.

T8.2 Standardization Activities

Results and innovation from the ABSOLUTE project has potential to influence the standards organizations and to achieve such impact, the project has put in place a standardization action plan from an early phase of the project (incorporated within the Deliverable 8.1.1). The aim of this standardization plan is to define an early strategy and contribution plan which will be kept as reference as the project progresses, and shall be revised and updated during the first phase of the project. The standardization plan was agreed based on a three point approach, where the first step is to identify the appropriate standardization activities and groups. Having identified the candidate standards bodies, their activities and the status of their work (and hence any timing window of opportunity issues), the second step is to identify the technologies that are developed within the project those are suitable to be brought to and discussed at standards bodies. Once the candidate standards bodies or possible new opportunity for standardization is identified, and having listed the candidate technologies, the last step is to perform a match making between these two, and clearly outline the window of opportunity, which is key to the success of any result-driven standardization plan. The candidate SDOs that the project has identified where it can contribute are 3GPP (TSG RAN, SA), ETSI (RSS, EMTEL, SES) and IEEE (P1900). The project will also closely follow and whenever possible provide contributions to the pre-standards organizations like NGMN, PSCE etc.

As part of standardisation actions, the industry partners (in particular, TCS and NOMOR) were following closely the 3GPP activities, and a contribution was made during 2013 to the RAN WG1 on D2D scenarios and requirements for public safety (ref. Table 5). Presentations were also made to the IEEE P1900 and ETSI SCN working groups. The project has also established links with ETSI RRS and will contribute to the actions planned within the RRS WG4 to execute the EC mandate M/512 for exploring potential areas of synergy among commercial, civil security and military applications. The project can contribute through its requirements analysis and the contact with the EAB to define the feasibility study for exploring potential synergies across the commercial, civil security and military domain in the medium/long term (5-15 years).

The following chapters will discuss in detail the dissemination activities achieved during the first year of the project.

2 Dissemination Activities

Dissemination in ABSOLUTE is perceived in two directions: i) dissemination for the project as a whole (for example; project workshops, demos, exhibitions, cluster activities, Future Networks forums etc), and ii) dissemination of particular innovative results (paper publications, conference attendance, etc). Based on the quality and experience of the consortium partners, it is expected that dissemination as a whole project will create a large impact. Therefore, besides the noticeable and high-quality paper and article publications, ABSOLUTE partners intend also to give tangible efforts in whole project dissemination.

The main dissemination objectives are summarized in the following:

- Dissemination of project results, concepts and publication of reports to the scientific community as well as to the general public to create awareness, involvement and uptake.
- Coordinate and consolidate the research WP inputs towards regulation and standardization;
- Provide technical inputs towards the regulation and standardization groups;
- Impact generation through interfacing the end users of the ABSOLUTE technologies using the EAB (External Advisory Board) to enable requirement and exploitation through validation process performed.
- To facilitate that ABSOLUTE technology solutions are integrated in products (terminal, networks) and product roadmaps of the different industrial partners within the consortium.
- To engage regulation bodies as well as industry forum and certification authorities into the steering of the technology development and the dissemination with ABSOLUTE.

In this chapter, we discuss the dissemination and communication activities covered in ABSOLUTE during the first reporting period. The report is following the dissemination action plan (which is reported in the deliverable, D8.1.1) that was established earlier in the project.

2.1 Publication of scientific results

Dissemination of scientific results of the project is a major priority for the project from an early stage. The project has defined a number of target journal, publications and conferences as potential venues to disseminate ABSOLUTE results, and these venues were chosen based on the technical concerns that define the project. In Section 2.1 of Deliverable, D8.1.1 [2], we have identified the major list of conference and important journals and magazines that are in the technical scope of ABSOLUTE.

In the following tables, Table 2-1 and Table 2-2, we present the list of publications achieved (including published, in press, and accepted) during the first year of the project (up to M12). Further, we also list the scientific articles that are currently undergoing the review process. An important achievement as part of the scientific results is that two articles presenting results from ABSOLUTE received Best Paper Awards at EAI PSATS 2013 Conference (paper title: "Airborne Base Stations for Emergency and Temporary Events") and IEEE ISWCS 2013 Conference (paper title: "A Novel Adaptive Call Admission Control Scheme for Distributed Reinforcement Learning Based Dynamic Spectrum Access in Cellular Networks"), respectively. While the first paper discussed about the general architecture and scenarios of ABSOLUTE, the second paper detailed results coming out of work carried out in WP3 in ABSOLUTE.

Table 2-1: Journal publications

#	Author(s)	Contribution Title	Journal/Book Name	Status
1.1.	A. Valcarce, M. Werner, T. Rasheed, K. Gomez, S. Kandeepan, L. Reynaud, R. Hermenier, A. Munari	Rapidly Deployable Base Stations for Public Safety and Mass Events: A land-and-air approach	IEEE Communications Magazine	Submitted
1.2.	S. Kandeepan, K. Gomez, T. Rasheed, L. Reynaud	Aerial-Terrestrial Communication: Terrestrial Cooperation and Energy Efficient Transmissions to Aerial Base Station	IEEE Transactions on Aerospace and Electronic Systems	#2 nd phase review
1.3.	S. Kandeepan et. al.	Temporal Spectrum Sensing and Performance Analysis	IEEE Transactions on Wireless Communications	Submitted
1.4.	T. Kaiser, H. Cao, W. Jiang, and F. Zheng	Cognitive Radio – A Current Snapshot and Some Thoughts on Commercialization for Future Cellular Systems	Journal of Signal Processing Systems, vol. 73, no. 3, pp. 217–225, Aug. 2013.	Accepted

Table 2-2: Conference/Workshop publications

#	Author(s)	Title	Conference	Location	Date	Type
2.1.	A. Valcarce, T. Rasheed, K. Gomez, S. Kandeepan, L. Reynaud, R. Hermenier, A. Munari, M. Mohoric, M. Smolnikar, I. Bucaille	Airborne Base Stations for Emergency and Temporary Events	5th International Conference on Personal Satellite Services (PSATS)	Toulouse, France	27-29 June 2013	Conference paper
2.2.	S. Narayan, K. Sithamparanathan, R. Evans, A. Munari, R. Hermenier, M. Marchitti, K. Gomez, T. Rasheed	Clustering Approach for Aerial Base-Station Access with Terrestrial Cooperation	Wi-UAV Workshop, IEEE Globecom 2013	Atlanta	9-13 Dec. 2013	Workshop paper
2.3.	I. Bucaille, S. Hetuin, A. Munari, R. Hermenier, T. Rasheed, S. Allsopp	Rapidly Deployable Network for Tactical Applications: Aerial Base Station with Opportunistic Links for Unattended and Temporary Events, ABSOLUTE example	IEEE Milcom 2013	San Diego	18-20 Nov. 2013	Conference paper (Invited)
2.4.	S. Arunthavanathan, S. Kandeepan and R. Evans	Spectrum Sensing and Detection of Incumbent-UEs in Secondary-LTE based Aerial-Terrestrial Networks for Disaster	IEEE CAMAD (ETPSC Session)	Berlin	27 Sept. 2013	Conference paper

		Recovery				
2.5.	S. Arunthavanathan, S. Kandeepan and R. Evans	Reinforcement Learning based Secondary User Transmissions in Cognitive Radio Networks	IEEE Globecom 2013 BWA – WS	Atlanta	9 Dec. 2013	Workshop paper
2.6.	A. Hourani, S. Kandeepan	Temporary Cognitive Femtocell Network For Public Safety LTE	IEEE CAMAD (ETPSC Session)	Berlin	27 Sept. 2013	Conference paper
2.7.	A. Hourani, S. Kandeepan	Cognitive Relay Nodes for Airborne LTE Emergency Networks	IEEE ICSPCS	Gold Coast	Dec. 2013	Conference paper
2.8.	A. Vilhar, A. Hrovat, T. Javornik, M. Mohorčič	Experimental analysis of wireless temporary networks deployed by low altitude platforms	IEEE CAMAD (ETPSC Session)	Berlin	Sept. 27, 2013	Conference paper
2.9.	H. Cao, W. Jiang, T. Javornik, M. Wiemeler, T.T. Nguyen, T. Kaiser	Spectrum awareness scheme of the rapidly deployable eNodeB for unexpected and temporary events	IEEE CAMAD (ETPSC Session)	Berlin	Sept. 27, 2013	Conference paper
2.10.	A. Hrovat, T. Javornik	Radio channel models for wireless sensor networks in smart city applications	International Conference on Electronics, Signal Processing and Communication Systems, EPSCO 2013	Venice	Sept. 28-30, 2013	Conference paper
2.11.	M. Mohorčič	Integration of terrestrial and airborne wireless networks for emergency situations : the ABSOLUTE project	In proc. 9th International Symposium on Information and Communication Technologies (INTSIKT 2013) :	Tuzla, Bosnia	June 3-4, 2013	Conference paper (Invited)
2.12.	M. Pesko, T. Javornik, M. Štular, M. Mohorčič	The comparison of methods for constructing the radio frequency layer of radio environment map using participatory measurements	4th Workshop of COST Action IC0902 on Cognitive Radio and Networking for Cooperative Coexistence of Heterogeneous Wireless Networks	Rome, Italy	9-11 Oct. 2013	Conference paper
2.13.	N. Morozs, T. Clarke and D. Grace	A Novel Adaptive Call Admission Control Scheme for Distributed Reinforcement Learning Based Dynamic Spectrum	IEEE Tenth International Symposium on Wireless Communication Systems (IEEE ISWCS), 2013	Mannheim, Germany	28 August 2013	Conference paper

		Access in Cellular Networks				
2.14.	N. Morozs, D. Grace and T. Clarke	Case-Based Reinforcement Learning for Cognitive Spectrum Assignment in Cellular Networks with Dynamic Topologies	Military Communications and Information Systems Conference (MCC 2013)	Saint Malo, France	Oct. 2013	Workshop paper
2.15.	Q. Zhao, T. Jiang, N. Morozs, D. Grace, T. Clarke	Transfer Learning: a Paradigm for Dynamic Spectrum and Topology Management in Flexible Architectures	IEEE VTC Fall 2013 (WMCR workshop)	Las Vegas	Sept. 2013	Workshop paper
2.16.	S. Rehan, D. Grace	Energy-Aware Topology Management for High Capacity Density Temporary Event Networks	IEEE ATC 2013	Vietnam	Oct. 2013	Conference paper (Invited)
2.17.	Sithamparanathan, K., K. M. Gomez, T. Rasheed, and L. Reynaud	Adaptive Energy Efficient Communications for Hybrid Aerial-Terrestrial Systems	IEEE ICC 2013 E2Nets Workshop	Budapest	June 2013	Workshop Paper
2.18.	2. Gomez, K. M., C. Sengul, N. Bayer, R. Riggio, T. Rasheed, and D. Miorandi	Achilles and the Tortoise: Power consumption in IEEE 802.11n and IEEE 802.11g networks	IEEE Online Conference on Green Communications: IEEE Greencom Online	Online Conf.	Oct. 2013	Conference paper
2.19.	Gomez, K. M., T. Rasheed, L. Reynaud, and I. Bucaille	Realistic Deployments of LTE-based Hybrid Aerial-Terrestrial Networks for Public Safety	IEEE CAMAD (ETPSC Session)	Berlin	Sept. 27, 2013	Conference paper
2.20.	A. Somov, T. Rasheed and V. Yedugundla	Power Control Game for Spectrum Sharing in Public Safety Communications	IEEE CAMAD (ETPSC Session)	Berlin	Sept. 27, 2013	Conference paper
2.21.	K. M. Gomez, Sithamparanathan, K., T. Rasheed, and L. Reynaud	Performance Evaluation of Broadband Aerial LTE Base- Stations for Emergency Recovery	IEEE Globecom 2013 (Wi-UAV Workshop)	Atlanta	Dec. 9, 2013	Workshop paper
2.22.	Goratti, L., K. M. Gomez, R. Fedrizzi, and T. Rasheed	A Novel Device-to-Device Communication Protocol for Public Safety Applications	IEEE Globecom 2013 D2D Workshop	Atlanta	Dec. 9, 2013	Workshop paper

2.23.	R. Fedrizzi, L. Goratti, K. Gomez and T. Rasheed	On the Feasibility of Handover over WiFi Backhaul in LTE-based Aerial-Terrestrial Networks	IEEE WCNC 2014	Istanbul	April 2014	Conference paper (submitted)
2.24.	K. Gomez, T. Rasheed, L. Reynaud and L. Goratti	FME: A flexible management entity for Virtualizing LTE Evolved Packet Core (EPC)	IFIP NOMS 2014	Krakow	May 2014	Conference paper
2.25.	W. Jiang, H. Cao, T. T. Nguyen, A. B. Güven, Y. Wang, Y. Gao, A. Kabbani, M. Wiemeler, T. Kreul, F. Zheng, and T. Kaiser	Key Issues Towards Beyond LTE-Advanced Systems with Cognitive Radio	IEEE SPAWC 2014	Darmstadt	June 2013	Conference paper
2.26.	H. Cao, W. Jiang, M. Wiemeler, T. Kaiser, and J. Peissig	A Robust Radio Access Technology Classification Scheme with Practical Considerations	IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC 2013)	London	September 2013	Conference paper
2.27.	H. Cao, W. Jiang, T. T. Nguyen, A. B. Güven, Y. Wang, Y. Gao, A. Kabbani, M. Wiemeler, T. Kreul, F. Zheng, and T. Kaiser	The Design of an LTE-A System Enhanced with Cognitive Radio	European Signal Processing Conference 2013 (EUSIPCO 2013), 2013	Marrakech, Morroco	Sept. 2013	Conference paper
2.28.	H. Cao, W. Jiang, and T. Kaiser	Multi-channel Robust Spectrum Sensing with Low-complexity Filter Bank Realization	IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC 2013)	London	Sept. 2013	Conference paper
2.29.	L. Reynaud and T. Rasheed	Deployable Aerial Communication Networks: Challenges for Futuristic Applications	Ninth ACM Int. Symp. on Performance Evaluation of Wireless Ad Hoc, Sensor, and Ubiquitous Networks, '12	Cyprus	Oct' 2012	Conference paper
2.30.	R. Riggio and T. Rasheed	Joule: Software-defined Energy Consumption Metering	6 th Workshop on Traffic Monitoring and Analysis	London	April '2014	Workshop paper (Submitted)
2.31.	W. Jiang, H. Cao, T. Kaiser	An MGF-based Performance Analysis for Opportunistic Relay Selection with Outdated CSI	IEEE VTC-Spring 2014	Seoul	May 2014	Conference paper (Submitted)
2.32.	W. Jiang, H. Cao, T. Kaiser	Analysis of Generalized Selection Combining in Cooperative Networks with Outdated CSI	IEEE WCNC 2014	Istanbul	April 2014	Conference paper (Submitted)

2.33.	W. Jiang, H. Cao, T. Kaiser	Power Optimal Allocation in decode-and-forward Opportunistic Relaying	IEEE WCNC 2014	Istanbul	April 2014	Conference paper (Submitted)
2.34.	W. Jiang, H. Cao, T. Kaiser	Opportunistic Space-Time Coding to Achieve Cooperative Diversity in Fast-Fading Channels	IEEE ICC 2014	Sydney	June 2014	Conference paper (Submitted)

2.2 ABSOLUTE Workshop

The project workshops are an important tool for the project dissemination. First, it provides key visibility of the project and its technical results within the scientific community, and secondly it helps the project in building a community surrounding the technical topics dealt in ABSOLUTE. Further, it is an excellent opportunity to bring together the industry-academic community and discuss openly about potential challenges evolving from the project, sharing with researchers and practitioners from the community. In this way, the consortium is able to keep up-to-date with the activities and innovations related to ABSOLUTE, for comparison and integration reasons. From ABSOLUTE, the partners have agreed as part of the dissemination strategy to organize one workshop per year in conjunction with prestigious conferences.

A workshop focussed on emerging trends in Public Safety Communications was organized by the project, in conjunction with the IEEE CAMAD Conference, at Berlin, during September 2013. The workshop was mainly organized by the ABSOLUTE project (co-chaired by CNET, Triagnosys, RMIT and Cassidian) with the support of the CELTIC SAN project. The workshop was a well attended event, which included interesting keynote speeches from Prof. Christian Wietfeld (Technical University Dortmund) who provided an interesting talk about “Aerial Ad-Hoc Network Provisioning: Design challenges and Solution Approaches”, and Mr. Matthew Baker (Alcatel Lucent, 3GPP RAN Chairman) who gave a talk about the “3GPP Programme to provide integrated Public Safety Communications through LTE”. The program also featured 3 invited talks from Prof. Fumiuki Adachi, Prof. Katsumi Iwatsuki and Prof. Nei Kato, all from Japan, who discussed in detail, the progress and perspectives of emergency and resilient communications initiatives in Japan. The workshop also featured an interesting panel discussion about the recent advances in public safety communications and relevant technological aspects. There were 10 technical papers that were presented during the workshop, where the workshop received 20 submissions, at an acceptance rate of 50%. The workshop CFP is provided in Figure 2-1.

The keynotes and invited speeches together with their abstracts are depicted below.

Keynote Speakers:

Prof. Christian Wietfeld, TU Dortmund Germany

Keynote Title: Aerial ad-hoc Network Provisioning: Design Challenges and Solution Approaches

Abstract: A new generation of light-weight and small airborne platforms (such as multicopters) enables the design of networked aerial robotic systems for a wide range of applications, for example in environmental monitoring and emergency response. In this talk, challenges and

solution approaches for a flexible self-configuring ad-hoc provisioning of aerial network services are addressed. The system design incorporates heterogeneous networking technologies such as aerial IEEE 802.11n hotspots, secure 802.11s Aerial mesh networks and the interference-aware integration of aerial LTE eNodeBs into existing cellular network infrastructure. For the optimal positioning of the aerial base stations, communication-aware algorithms for microscopic as well as macroscopic mobility control are discussed. An IP-based group communication protocol (Push-to-X) is introduced as multi-media network service specifically useful in emergency response scenarios. Due to the use of heterogeneous network technologies ranging from WLAN to satellite, QoE optimization methods of the group communication service based on statistical network classification are proposed. The performance evaluation results presented in the talk build on a model-based design approach which includes a dedicated multi-scale simulation environment, a detailed physical channel representation, analytical models and real-world experiments.

Mr Matthew Baker, Alcatel Lucent

Keynote Title: 3GPP's Programme to provide integrated Public Safety Communications through LTE

Abstract: Many countries are on the verge of major investments to upgrade their public safety communication networks to benefit from the same spectacular advances enjoyed by commercial mobile networks in recent years, progressing from simple voice communications to full broadband service provision. The use of LTE technology for these upgrades offers exciting opportunities for improving the capabilities of public safety networks, as well as benefitting from economies of scale through shared development and infrastructure costs. However, public safety communication systems have some unique requirements which require the introduction of new features into LTE, such as direct terminal-to-terminal communication and group call functionality. This presentation reviews the specialist requirements of public safety communication systems compared to current commercial mobile systems, and explains the work programme of 3GPP to ensure that these requirements are satisfied by LTE within the timeframe required by the forthcoming national public safety network deployments

Invited Talks:

Prof. Fumiyuki Adachi, Tohoku University, Japan

TITLE: Disaster-resilient Multilayered Communications Network

Abstract: Learning from lessons of The Great East Japan Earthquake in March 2011, MIC (Ministry of Internal Affairs and Communications) of Japanese Government initiated many R&D programs in order to establish new communications systems which are robust, resilient, and dependable in case of disaster and emergency. One of those was our project “Multilayered communications network”. In this talk, the concept of “Multilayered communications network” will be introduced and some experimental results will be presented.

Prof. Katsumi Iwatsuki, Tohoku University, Japan

Talk Title: Overview on Activities of ROEC in Tohoku University

Abstract: In this presentation, we mention about the disaster reconstruction/regional regeneration research project in Tohoku University after the East Japan Great Earthquake, which exposed the weaknesses of the most advanced information communications network in the world. We also

introduce Research Organization of Electrical Communication or ROEC in Tohoku University, which established to promote the disaster reconstruction/regional regeneration research project and to achieve the most advanced disaster-resistant information communication network, and some ICT reconstruction projects in ROEC.

Figure 2-1: ABSOLUTE Workshop CFP

Table 2-3: ETPSC Workshop Program

08:45 - 09:00	Workshop Opening
	Welcome address: Workshop Chairs
09:00 - 11:00	Keynotes Session
	Session chair: Isabelle Bucaille, Thales Communications & Security, France
	<ul style="list-style-type: none"> • Keynote #1: Prof. Christian Wietfeld (TU Dortmund University, Germany) <i>"Aerial ad-hoc Network Provisioning: Design Challenges and Solution Approaches"</i> • Keynote #2: Matthew Baker (Alcatel Lucent, U.K.) <i>"3GPP's programme to provide integrated public safety communications through LTE"</i>
11:00 - 11:30	Coffee Break
11:30 - 13:00	Technical Session #9
	Session chair: Hanwen Cao, University of Duisburg Essen, Germany
	<ol style="list-style-type: none"> 1. <i>Temporary Cognitive Femtocell Network For Public Safety LTE.</i> Akram Al-Hourani (RMIT University, Australia); Sithamparanathan Kandeepan (RMIT University, Australia) 2. <i>Spectrum Awareness Scheme of the Rapidly Deployable eNodeB for Unexpected and Temporary Events.</i> Hanwen Cao (Universität Duisburg-Essen, Germany); Wei Jiang (University of Duisburg-Essen, Germany); Tomaz Javornik (Jozef Stefan Institute, Slovenia); Michael Wiemeler (Universität Duisburg-Essen, Germany); Trung Thanh Nguyen (Faculty of Engineering, The University of Duisburg-Essen, Germany); Thomas Kaiser (Universität Duisburg-Essen, Germany) 3. <i>Spectrum Sensing and Detection of Incumbent-UEs in Secondary-LTE based Aerial-Terrestrial Networks for Disaster Recovery.</i> Senthuran Arunthavanathan (RMIT University, Australia); Sithamparanathan Kandeepan (RMIT University, Australia); Rob Evans (The University of Melbourne, Australia) 4. <i>Power Control Game for Spectrum Sharing in Public Safety Communications.</i> Andrey Somov (Create-Net, Italy); Tinku Rasheed (Create-Net, Italy); Venkata Kiran Yedugundla (NUS, Singapore) 5. <i>An Approach for Discrete-Event Simulations of Alamouti Scheme in Ad Hoc Networks.</i> Everton Andrade (University of Brasilia, Brazil); Fadhil Firiyaguna (University of Brasilia, Brazil); Ana Carolina Christófaro (University of Brasilia, Brazil); Marcelo M Carvalho (University of Brasilia, Brazil)
13:00 - 14:30	Lunch Break
14:30 - 16:15	ETPSC Panel
	Moderator: Tinku Rasheed (Create-Net, Italy)
	Speakers:
	<ul style="list-style-type: none"> • Isabelle Bucaille (Thales Communications & Security, France): Overview of the FP7 ABSOLUTE project. • Prof. Fumiuki Adachi (Tohoku University, Japan): Disaster-resilient Multilayered Communications Network • Prof. Katsumi Iwatsuki (Tohoku University, Japan): Overview on Activities of ROEC in Tohoku University
16:15 - 16:30	Coffee Break
16:30 - 18:00	Technical Session #10
	Session chair: Macia Mut Vidal, Triagnosys, Germany

1. *Experimental Analysis of Wireless Temporary Networks Deployed by Low Altitude Platforms.* Andrej Vilhar (Jozef Stefan Institute, Slovenia); Andrej Hrovat (Jožef Stefan Institute, Slovenia); Tomaz Javornik (Jozef Stefan Institute, Slovenia); Mihael Mohorcic (Jozef Stefan Institute, Slovenia)
2. *A Heuristic Computation Method for Monitoring Trails Terminated at Specified Nodes.* Nagao Ogino (KDDI R&D, Japan); Hidetoshi Yokota (KDDI Labs, Japan)
3. *Traffic analysis and network dimensioning through simulation and emulation for Ka band high capacity satellite systems.* Luca Carniato (Opensky s.r.l, Italy); Federica Fongher (Opensky, Italy); Michele Luglio (University of Rome Tor Vergata – Dip. Ing. Elettronica, Italy); Walter Munarini (Opensky, Italy); Cesare Roseti (University of Rome Tor Vergata, Italy); Francesco Zampognaro (University of Rome Tor Vergata, Italy)
4. *Toward Terminal-to-Terminal Communication Networks: A Hybrid MANET and DTN Approach.* Yuichi Kawamoto (Tohoku University, Japan); Hiroki Nishiyama (Tohoku University, Japan); Nei Kato (Tohoku University, Japan)
5. *Realistic Deployments of LTE-based Hybrid Aerial-Terrestrial Networks for Public Safety.* Karina Mabell Gomez (Create-Net, Italy); Tinku Rasheed (Create-Net Research, Italy); Laurent Reynaud (Orange, France); Isabelle Bucaille (Thales Communications, France)

18:00

Workshop Closing & Announcement of 2nd ABSOLUTE project workshop

After the successful first ABSOLUTE workshop edition, the project partners have started to work on the second project workshop, which will be organized at IEEE ICC 2014. The workshop, titled as *Advances in Public Safety and Emergency Communications* (APSEC Workshop) will take place on June 14, 2014 at Sydney, co-located with the IEEE ICC 2014 Conference, a premier conference for communications and networking. The workshop CFP is provided in Figure 2-2. Further details of the workshop are provided in the workshop website here: <http://www.absolute-project.eu/apsec2014/>

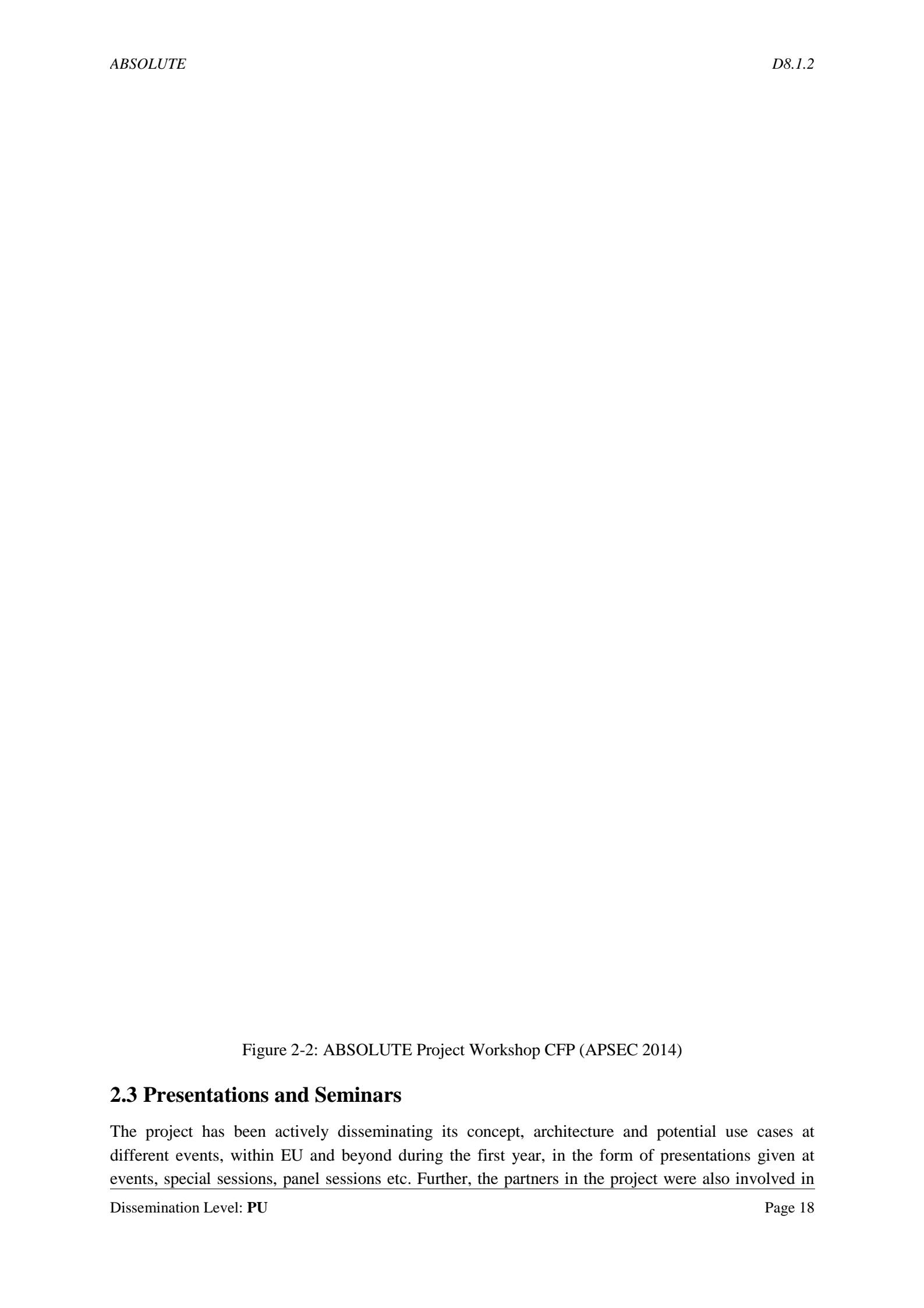


Figure 2-2: ABSOLUTE Project Workshop CFP (APSEC 2014)

2.3 Presentations and Seminars

The project has been actively disseminating its concept, architecture and potential use cases at different events, within EU and beyond during the first year, in the form of presentations given at events, special sessions, panel sessions etc. Further, the partners in the project were also involved in

presenting project related material at high-level events organized by public bodies and other industrial workshops. ABSOLUTE project organized a panel session on Public Safety Future Networks, at the FuNEMS-2013 conference, in Lisbon, during July 2013. The panel session was chaired by Ms. Isabelle Bucaille, the ABSOLUTE project coordinator. The panel session featured invitees from ECO (Mr. Thomas Weber), BAPCO (Mr. Jim Strother) and from Waseda University, Japan (Prof. Shigeru Shimamoto). The panel session was well attended and well perceived by the conference organizers and the EU commission alike.

The videos of the presentations and the short pitch statements about the panel session are available in YouTube channel maintained by the Net!Works ETP, which coordinated the FuNEMS panel sessions. The Figure 2-3 shows a snapshot of the panel description at the FuNEMS 2013 website.

The screenshot shows a Firefox browser window displaying the 'Future Network & Mobile Summit 2013' website. The main header reads 'Future Network & Mobile Summit 2013' and '3 - 5 July 2013, Lisbon, Portugal'. On the left, there's a sidebar with a navigation menu including 'General Information', 'Programme', 'Keynote Speakers', 'Panel Sessions' (which is expanded to show 'Towards Virtualised Networks', 'Optical Networking', and 'Public Safety Future Networks'), 'Registration', 'Call for Papers', 'Online Submission', 'Practical Information', 'Accommodation', 'Exhibition', 'Paper Repository', and 'Previous Events'. The main content area has a blue background and contains text about the 'Public Safety Future Networks: Industry and Stakeholder views on Emerging Technologies, Standardisation Status & Regulatory Issues'. It discusses the role of wireless communications in emergency and disaster relief situations, mentioning LTE-A and its impact on mobile applications. Below this, under 'Questions that will be discussed include:', there is a bulleted list of topics such as lessons learned from disasters, user needs, regulatory issues, LTE promises, new architectures, and standardization challenges. At the bottom of the content area, there's a section titled 'Panel Participants'.

Figure 2-3: ABSOLUTE Panel at FuNEMS 2013

At the EC level, the project has been active within the RAS cluster with participation to both the Working Groups of the cluster, on PHY layer advances for 5G (WG#1) and novel network architectures for 5G (WG#2). Presentations of the project were given at the EC concertation meetings, during October 2012 (10th Future Networks Cluster meeting) where a general overview of the project was provided, and February 2013 (11th Future Networks Cluster meeting), during which a presentation of the standardization plan of the project was presented. The project partners were active in disseminating the information about the project at various other events in the form of invited talks, session organizations, panel participation etc. The list of these activities carried out during the first year of the project is provided in Table 2-4 and Table 2-5 respectively.

Table 2-4: Interaction with relevant EU and International initiatives, platforms and forums, invited talks etc.

#	Author(s)	Title	Event	Location	Date	Type
1.	I. Bucaille, T. Rasheed	ABSOLUTE Project presentation	FP7 Concertation meeting: Future Networks	Bruxelles	10- 11/10/2013	Presentation

2.	I. Bucaille, T. Rasheed	ABSOLUTE Standardization Plan	FP7 Concertation Meeting: Future Networks (RAS Cluster)	Bruxelles	Feb. 2013	Presentation
3.	T. Rasheed	Emerging Technological Trends in Public Protection and Disaster Relief	EIT ICT Labs: Digital Cities, Theme on Citizen Safety	Trento	6/9/2013	Presentation/Seminar
4.	I. Bucaille	ABSOLUTE Project presentation and Panel chairing	FuNEMS Panel on Public safety Future Networks	Lisbon	July 2013	Presentation + Panel chair
5.	T. Rasheed	Public Safety Communications Panel	IEEE CAMAD Special Session	Berlin	Sept. 27, 2013	Panel Chair
6.	I. Bucaille	Overview of ABSOLUTE project	IEEE CAMAD Special Session	Berlin	Sept. 27, 2013	Presentation
7.	I. Bucaille	Standardization and Regulation initiatives in ABSOLUTE	FP7 CRS-i special session	Lisbon	July 2013	Presentation
8.	L. Reynaud	ABSOLUTE Project: Introduction	Highly Robust Networking Workshop, Joint Orange-Japan event	Online	March 2013	Presentation (https://sites.google.com/site/highlyrobustnetworkingworkshop/home/program)
9.	T. Kaiser	Special Session: Cognitive LTE-ABSOLUTE	European Signal Procesing Conference 2013 (EUSIPCO)	Morocco	Sept. 2013	Session organization
10.	K. Sithamparamathan	Cognitive Radio Technology: Embedding Intelligence in Radios	IEEE/IET/Eng of Aus joint Invited Talk	Melbourne	July 2013	Invited Talk
11.	K. Sithamparamathan	A deployable wireless cognitive network to support disaster relief activities	Victoria State Innovation and Technology Showcase	Melbourne	October 29, 2013	Invited Talk

Table 2-5: Organization of workshops, sessions, training activities etc

#	Organiser(s)	Title	Event	Location	Date	Type	Link
1.	T. Rasheed, K. Sithamparathan, I. Bucaille, and A. Valcarce	First International IEEE Workshop on Emerging Technologies and Trends for Public Safety Communications (ETPSC)	IEEE CAMAD 2013	Berlin	27 Sept. 2013	Workshop	http://www.absolute-project.eu/etpsc2013/
2.	T. Rasheed, K. Sithamparathan, D. Grace, I. Bucaille	International Workshop on Advances in Public Safety and Emergency Communications (APSEC 2014)	IEEE ICC 2014	Sydney	June 2014	Workshop	http://www.absolute-project.eu/apsec2014/
3.	I. Bucaille, T. Rasheed	Public Safety Future Networks: Industry and Stakeholder views on Emerging Technologies, Standardisation Status & Regulatory Issues	FUNEMS 2013	Lisbon	July 2013	Panel Session	http://www.futurenetworksummit.eu/2013/default.asp?page=panel-pubnet
4.	T. Kaiser	Special Session: Cognitive LTE-ABSOLUTE	European Signal Processing Conference 2013 (EUSIPCO)	Morocco	September 2013	Session organization	http://www.eusipco2013.org/program.html
5.	I. Bucaille	ABSOLUTE Project Presentation and Overview	ABSOLUTE Stakeholder Meeting (EAB)	Paris	Feb 2013	Session Organization	

2.4 Cooperation with other project and initiatives

During the first year, we have identified the relevant projects and initiatives that are of interest for ABSOLUTE. The EC concertation and cluster platform enabled through the RAS cluster activities was the tool especially for linking with complementary projects that are having similar interests technically and also in terms of perspectives, looking at future public safety networks within 5G.

In this regard, the project has identified the following EU FP7 projects where synergies can be explored during the later phase of the project.

- FP7 METIS (<https://www.metis2020.com/>): METIS project investigates scenarios and architectures suitable for 5G mobile technologies. As massive device-to-device communications is a major research item in METIS, which is also considered quite strongly in ABSOLUTE, there is ample material for joint investigation of the problems, and in this regard, from ABSOLUTE, through common partners and through WG2 of the RAS cluster, will establish links with METIS and explore joint dissemination and joint publication opportunities during the second reporting period of the project.
- FP7 Emphatic (<http://www.ict-emphatic.eu/>): EMPhAtiC project is developing enhanced multicarrier techniques for optimized currently available radio frequency bands in providing broadband data services in coexistence with narrowband legacy services, specifically targeting PMR/PPDR applications. ABSOLUTE has already established dialogue with the project and will enter into a collaboration agreement soon within the framework of the RAS cluster, mainly to explore joint dissemination opportunities, and joint position papers on the future of public safety mobile broadband communications, as the shift towards 5G technologies is apparent.
- FP7 MOTO (<http://www.fp7-moto.eu>): MOTO project mainly provides solutions for traffic offloading strategies and define specific topics for mobile terminal management, trust, flow and session management aspects for offloading. As redundancy and resilience are important aspects for improving link availability in public safety scenarios, there is a scope of joint investigation of traffic offloading strategies to save energy and optimize valuable communication resources in a public safety environment. This will be explored jointly with the MOTO project through joint publications, as there are common partners within the projects which will make such a collaboration and synergy practical.
- FP7 TROPIC (<http://www.ict-tropic.eu/>): Tropic project mainly looks at integrating cloud computing and storage resources with the femtocells to offer improved user experience latency and DL/UL speeds. There is a possibility to investigate jointly aspects related to mobile small cells which are particularly suited for mobile and dynamic deployments as in ABSOLUTE. We consider to liaise and cooperate with TROPIC project using common platforms like workshops, joint publications and joint sessions at conference, including EUCNC 2014.

The project has already established a liaison agreement with the CELTIC SAN Project (<http://projects.celtic-initiative.org/SAN/>) which is developing 4G based rapidly deployable solutions for disasters and other events, including military actions. The two project collaborated to co-organize the first ETPSC workshop at IEEE CAMAD 2013, and the collaboration is expected to continue during the course of the ABSOLUTE project.

In terms of initiatives and industry fora, ABSOLUTE has started to discuss in detail with the PSCE forum (Public Safety Communications Europe) to explore the platform to disseminate the project results and to update to the extended stakeholder community about the developments taking place in the project. Another potential fora of interest for ABSOLUTE is the small cells forum, where ABSOLUTE partners will follow the activities and working groups during the second reporting period, in particular, looking at possible pre-standards initiatives related to mobile small cell based solutions, adapted to public safety and special events. The project is also committed to explore dedicated effort towards impact achievement through collaboration with the relevant ETP platforms. In this regard, the project members are involved with the Net!Works and ISI ETPs (with commitment

to continue the cooperation in the joint Net!Works and ISI initiative in H2020) in defining related priorities towards public safety communications and its impact within the integrated scenarios for public safety broadband for 5G. The project through consortium partners will also be exploring possible influence within the WWRF and NGMN alliance industry bodies.

2.5 ABSOLUTE Website

The project has an official website, which is available at:

www.absolute-project.eu or www.absolute-project.com

All project related information can be found at the website, and will be used as a space to promote the ABSOLUTE project and to communicate about its progress to the outside world. It is also used as a collaborative space among the project members. The ABSOLUTE webpage went public since October 1, 2012.

The ABSOLUTE project website is designed to be simple and easily accessible, and is built using the Joomla platform. The website has the following pages: **Home, About ABSOLUTE, Consortium, Report, Blog, News, Contacts**. The navigation menu is placed at the top to be easily accessible and for visitors to easily go to each information that they require to access. The submenus which are available with the menu items will provide easy browsing experience to the user. The Figure 2-4 shows the ABSOLUTE project website home page where as the Figure 2-5 provides an illustration of the project disclaimer and the twitter feed embedded within the project website. All the dissemination activities including the workshop pages and other communications are coordinated through the project website.

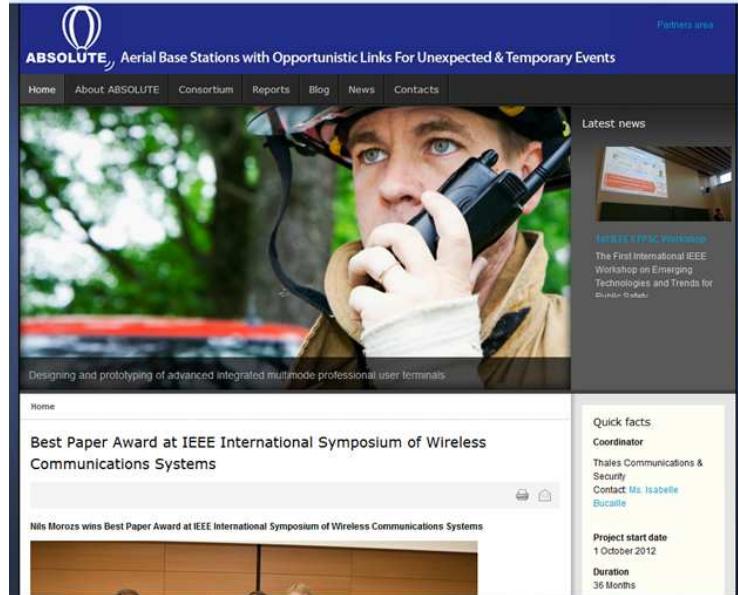


Figure 2-4: ABSOLUTE website homepage

The screenshot shows a page from the ABSOLUTE website. At the top, there is a text block about user questionnaires and contact information for Jim Strother. Below this is a navigation bar with buttons for START, PREV, 1, 2, NEXT, and END. The page is labeled "Page 1 of 2".

Partners: Jožef Stefan Institute logo.

Follow us on Twitter:

- Tweets:**
 - ABSOLUTE Project (@FPT_Absolute) - 26 Nov: High-Altitude Balloon Provides Broadband to First Responders [govtech.com/public-safety...](#)
 - ABSOLUTE Project (@FPT_Absolute) - 25 Nov: The Evolution of First Responder Communications™ as seen by different

Get updated: Do you want the latest updates from ABSOLUTE project? Go to the ABSOLUTE [blog page](#) or subscribe to our [RSS](#).

Disclaimer: ABSOLUTE project and its consortium are the owners and sole responsible for the contents of this website. It does not represent the opinion of the Community and the Community is not responsible for any use that might be made of information contained on this site.

EU Co-funding Information: ABSOLUTE is co-founded by the European Commission under the SEVENTH FRAMEWORK PROGRAMME (Information and Communication Technologies). Logos for Future Networks and the European Union are shown.

Figure 2-5: ABSOLUTE website disclaimer and EU co-funding information

The project blog is meant to motivate the partners to periodically publish news about the project experience or results that are public material which can be made available to the general public. It will ensure that regular project news is made available to the public. The website also embeds links to the social networks like Twitter feeds and feed to Facebook pages, which will ensure that updates in the website are regularly updated to the social network space as well.

A statistics collection tool was enabled for the website to keep track of the number of users accessing the website and to profile the pages within the website that are creating interest for the users accessing the website. This tool was activated since June 2013. In the following Figure 2-6, we provide some information about the access pattern of ABSOLUTE website by the general public, measured between June-November 2013.

Figure 2-6: ABSOLUTE website analytics data on page visits during June –November 2013

The project is also active within social media, especially in Twitter, and is currently considering starting a facebook page to disseminate news about the events and project updates to the community. The snapshot of the twitter handle is provided in Figure 2-7.



Figure 2-7: ABSOLUTE Twitter handle

2.6 Newsletters and Press Releases

Various press releases and articles were published about the ABSOLUTE project both in perspectives and about its architecture and potential impact for the public safety community. Lastly the project website is being actively used to disseminate the project progress and results, and the analytics tool demonstrates that during a period of five months between June-October 2013, there have been more than 1500 unique visits to the project website, which shows the improving popularity of the website, and its contents.

Table 2-6: News items published about ABSOLUTE

#	Author(s)	Contribution Title	Type	Link
1)	DLR	schwebende-kommunikationstechnik	Magazine Article	http://www.pm-magazin.de/a/schwebende-kommunikationstechnik
2)	-	Cell Tower in a Kite	Magazine Article, dailywireless.org	http://www.dailywireless.org/2013/07/30/cell-tower-in-a-balloon/
3)	-	Helikite balloons can hoist emergency LTE network after natural disaster	Magazine Article, engadget.com	http://www.engadget.com/2013/07/30/helikite-balloons-can-hoist-emergency-lte-network/

4)	-	An Inflatable Emergency Airborne Communications Network	Magazine Article, MIT Technology Review	http://www.technologyreview.com/view/517436/an-inflatable-emergency-airborne-communications-network/
5)	BAPCO	ABSOLUTE Project News	British APCO Journal Volume 19 issue 1, Feb 2013	Contained an informative introductory article on ABSOLUTE for the benefit of B-APCO members and other readers

2.7 Stakeholder Interaction and EAB

The interaction with the EAB members is organized by the project coordinator together with the support of the project partner, BAPCO and monitored by the WP2 leader. To better coordinate the interaction with the EAB and to ensure their cooperation and collaboration is maintained, in the dissemination action plan and in the project management task in WP1, regular interaction with the EAB members by communicating the project progress periodically using the dissemination means of the project and through a special access to the project website to the members of the EAB was defined. Further, two EAB meetings is planned to be organized during the project life cycle, mainly to validate the inputs from the EAB members and further to showcase the developments within the project.

The first such meeting was organized during early 2013 at Paris. The final project workshop organized by the project will also incorporate the participation of the EAB members where the project results and innovations will be showcased to the stakeholders.

3 Standardisation Activities

Standardization is a key goal in ABSOLUTE towards achieving impact and the ABSOLUTE partners are committed to initiate pre-standardization activities at an early phase of the project to ensure that some impact can be achieved already during the project lifecycle and beyond, also in line with the standardization timeframe. An initial standardization plan was agreed upon and put in place within Task 8.2 (available in [2]). The aim of the standardization plan is to define an early strategy and contribution plan which will be kept as reference as the project progresses, and shall be revised and updated during the first phase of the project.

To summarize the standardization action plan, a three step approach was identified to define the standardization strategy.

- Identifying the corresponding standards groups that are of interest and relevance to ABSOLUTE, and to review their activities and the status of their work (and hence any timing window of opportunity issues),
- To identify the technologies that are developed within the project those are suitable to be brought to and discussed at standards bodies. There are several factors that need to be considered in identifying the technologies that are selected to be represented/promoted to standards.
- Finally, the matchmaking is done comparing the identified SDO with the technical aspect that need to be promoted within a standard, and to clearly outline the window of opportunity, which is key to the success of any result-driven standardization plan.

A risk assessment was also carried out related to the standardization action plan, together with some matching mitigation plan to take into account potential risks which are high when approaching standards organizations, especially from R&D projects. A key aspect of the standardization plan is that, the project has discussed and identified the partners, mainly industrial players and research centres, that are having interests towards respective standards bodies, mainly to streamline the contributions towards the standards and to have placeholders and responsible members who are following up and keeping the consortium updated about each standard that are targeted by the project.

While preparing the standardization plan, a detailed overview of the standards organizations and the technical areas of interest for ABSOLUTE within each of these standards group were identified. The focus of the project on LTE and LTE-A clearly indicates that, for any project results which are related to the aspects of LTE and LTE-Advances which are standardized, the project must aim to bring these results to the relevant standards bodies. LTE and LTE-Advanced are heavily standardized technologies, infact the whole standardization body (3GPP) is dedicated to the standardization of LTE and LTE-Advanced. A major contribution identified by the project is to lead the project track towards the harmonization of public safety requirements within the 3GPP LTE standards, where the project is expected to create a wider impact with significant contributions from the research aspects (e.g., UE LTE direct mode communications, LTE-A air interface from aerial platforms). Indeed, a new working group dedicated to Proximity Services (LTE direct mode) has been launched recently and the industry partners who are active within the 3GPP is participating actively to this group and to provide inputs from the ABSOLUTE project.

In terms of expected contributions to the standards groups, the project also intends to follow and whenever possible contribute to the ETSI RRS (Reconfigurable Radio Systems) and ETSI ERM

(Electromagnetic compatibility and Radio spectrum Matters) working groups given their recent focus on public safety and disaster relief scenarios. Major contributions to system level specifications, needed modifications in MAC layer and higher layers for a tailored resilient and flexible rapidly deployable network suitable for broadband PPDR emergency recovery deployments are expected to be provided. User requirements and technical contributions is also planned to be driven through the regular exchange of information between the PSCE Europe, ECC, 3GPP and ETSI/RSS. Moreover, contributions on network resilience and security aspects are expected to be provided to the ETSI EMTEL (Emergency Telecommunications) WG.

The Table 3-1 presents the identified candidate technologies of interest to be standardized, and the matchmaking with the respective SDO which is performing standardization on related technical topics, and their timeframe or window of opportunity. Further, we have also identified the project partners who will lead the activity within each standards working group and meetings.

Table 3-1: Matching candidate technologies to standardization groups

Candidate Technology	Standards Body	Specific WG/Technical Group	Window of Opportunity	Responsible Partners
Direct Mode Communications (alternately D2D or Device-to-Device)	3GPP	RAN/ Rel-13	During 2013, 2014	TCS, NOM
	ETSI	RRS WG-2/3	From 09/2013	TCS, CNET
Opportunistic Dynamic Spectrum Access Schemes	ETSI	RRS	During 2013	CNET
	IEEE	P1900.7	During 2013, 2014	CNET, RMIT, UOY
Virtual EPC Concepts	3GPP	SA/RAN – Rel-13	During 2014	FT
Reconfigurable MM-UEs	ETSI	RRS WG-2/3	2013 onwards	TCS, CNET
Direct Mode Relays	3GPP	RAN/Rel-13	During 2014	TCS, NOM
Satellite Messaging Services (S-MIM)	ETSI	TC SES	2013 onwards	DLR, EUT

In Table 3-2, the list of contributions made from the project to the various SDOs are provided. While the representation during the first reporting period has been rather low owing to the time spent in identifying the right technical elements that need to be approached at a standardisation body, particularly since we are dealing with the public safety market model in ABSOLUTE. In the next subsections, we summarize the ongoing activities within each of the standards WG, and we remark the potential expected contributions from ABSOLUTE.

Table 3-2: Contributions/presentation to standards

#	Author(s)	Title	SDO	Location	Date	Type
1.	E. Seidel, I. Bucaille, L. Goratti, K. Gomez	Public Safety specific D2D Scenarios and Requirements	3GPP TSG-RAN WG1	Chicago	19/4/13	Presentation, Document – R1-131215

2.	T. Rasheed, R. Hermenier, K. Sithamparanathan, D. Grace	Public Safety Communications: Use Case Proposal	IEEE P1900	London	24/4/2013	Presentation
3.	R. Hermenier et al.	ABSOLUTE : Aerial Base Stations with Opportunistic Links for Unexpected & Temporary Events	ETSI SCN WG Meeting #7	Germany	9/10/2012	Presentation

3.1 Contributions to Standards bodies

3.1.1 3GPP

In the standardization plan [2], the candidate technologies studied within ABSOLUTE that are of interest within 3GPP were identified. The industry partners in the project, active in the standardisation groups were following a selection of work items that are currently under development in 3GPP. In particular, the most important work taking place within the 3GPP RAN WGs is related to the LTE Device-to-Device Proximity Services., where during 2013, the 3GPP study aims to collect use cases and creates a set of potential requirements for operator network controlled discovery and communications between UEs that are in proximity, under continuous network control, and are under 3GPP network coverage, for:

- Commercial/social use
- Network offloading
- Public Safety
- Integration of current infrastructure services, to assure the consistency of the user experience including reachability and mobility aspects

The communication path can be established directly between the UEs or routed via local eNB(s). UEs may also use WLAN for communication. Additionally, the study item will study use cases and identify potential requirements for Public Safety, in case of absence of EUTRAN coverage.

From ABSOLUTE, the partners are closely following the RAN1, RAN2 and RAN4 WGs. In particular, within WG1, D2D Proximity Services was discussed during RAN1#74bis and RAN1#75. During the meetings, RAN1 continued discussing device to device communication, synchronization, and discovery. From ABSOLUTE, a contribution was made (ref. Table 3-2) outlining the scenarios and requirements from the public safety dimension, in particular, targeted at the Out of network coverage, and partial network coverage scenarios.

In general in WG1, the current status within RAN#1 is that:

- Working Assumption for further study: All data carrying physical channels use SC-FDMA for communication.
 - LS was sent to RAN4 asking guidance on use of OFDMA versus SC-FDMA.
- From an individual UE perspective on a given carrier D2D signal reception and cellular uplink transmission do not use full duplex.
- For multiplexing of a D2D signal and cellular signal from an individual UE perspective on a given carrier:

- FDM shall not be used.
- Time division multiplexing (TDM) can be used. Details are FFS.

Several agreements were reached, where ABSOLUTE partners also contributed to the discussions, in particular for the synchronization (especially of interest for ABSOLUTE for the out of network coverage usecase), communication and discovery

Within RAN WG2, LTE Device to Device (D2D) Proximity Services was discussed during RAN2#83Bis and RAN2#84. During the meetings, RAN2 continued discussing 1:M broadcast device to device communication, and discovery. From ABSOLUTE, a topic of particular interest is the 1:M D2D Broadcast Communication, where the partners are working to contribute to the baseline scenarios. Further, RAN WG4 started discussing D2D aspects as well recently at RAN4#64bis and RAN4#65. During a RAN4#65 a reply to RAN1 LS on in-band emissions was agreed to. For single cluster transmission RAN4 two sets of values were agreed as offsets for typical values from minimum performance requirements. No agreement was achieved on multi cluster transmissions and is still there are opportunities to discuss within the WG.

At this moment, there are several open issues related to the D2D study items, which we are closely monitoring to identify opportunities to contribute, based on the progress of work within ABSOLUTE. Of particular interest are the following issues, which are inline with ABSOLUTE interests, in particular, studied within WP3.

- Potential gains obtained by LTE device-to-device direct discovery with respect to existing device-to-device mechanisms
- Possible impact to existing operator services (e.g. voice calls) and operator resources
- Terminal and spectrum aspects
- Design of device to device discovery (Public Safety and General Scenario use cases)
- Design of broadcast device to device communication (Public Safety use cases)
- Design of groupcast device to device communication (Public Safety use cases). The basic functionality will be based on device to device broadcast communication.
- Design of device to device relay (Public Safety use cases). The basic functionality will be based on device to device broadcast communication.

3.1.2 ETSI

ETSI TC Reconfigurable Radio Systems (RRS): The scope of this technical committee is on standardization activities related to Reconfigurable Radio Systems encompassing system solutions related to Software Defined Radio (SDR) and Cognitive Radio (CR); the committee's activities include the definition of RRS requirements, identifying gaps where existing standards do not fulfil those requirements and proposing solutions to fill those gaps. The standardization activities are mostly focused to Telecommunication systems based on RRS concepts and white spaces in particular. From ABSOLUTE, in particular WP3, the partners are monitoring the activities within RRS (WG1 and WG3) with regards to opportunistic spectrum access concepts and reconfigurability aspects. The cognitive radio security related mechanisms, are also relevant to the WG3 work on RRS security (with specific focus on the MM-UE terminals). In this aspect, the partners have started to monitor and identify potential contributions to define the requirements and architecture for reconfiguring the radios in mobile devices. In this regard, the partners are following the work based on the Use Cases defined in ETSI TR 103 062 (“Use Cases and Scenarios for SDR Reference Architecture for Mobile Device”),

ETSI TR 102 839 (“Multiradio Interface for Software Defined Radio (SDR); Mobile Device Architecture and Services”) and ETSI TR 102 944 (“Use Cases for Baseband Interfaces for Unified Radio Applications of Mobile Device”).

Since September 2013, the WG4 is specifically focusing on executing the EC mandate M/512 [4] on exploring potential areas of synergy among commercial, civil security and military applications. These include (but they aren't limited to), (i) Architectures and interfaces for dynamic use of spectrum resources among commercial, civil security and/or military domains for disaster relief for wireless broadband connectivity. This objective will require collaboration with spectrum regulatory organizations, (ii) Reconfigurable mobile device architecture for commercial and civil security applications. In this context, the WG4 Terms of Reference (ToR) has been refined and includes the following responsibilities to derive and define all kinds of synergies among commercial, civil security and military applications including but not limited to:

- Use Cases, Requirements, Architectures and Interfaces for dynamic use of spectrum resources among commercial, civil security and military domains
- Use Cases, Requirements, Architectures and Interfaces related to network sharing between civil security and commercial domain
- Reconfigurable Mobile Device architecture for commercial and civil security applications.

In this context, the WG4 is conducting a feasibility study to explore potential synergies across the commercial, civil security and military domain in the medium/long term (5-15 years). Emergency and crisis situations as explored in ABSOLUTE requires an increased level of cooperation between these entities, and in particular, related to the harmonized use of spectrum and network deployments and operation during such events.

The work item on the Feasibility study is expected to take into account the following directions;

- Definitions of use cases
- Definition of potential system requirements
- feasibility and implementation obstacles of the use cases which may include related market information
- Analysis on the regulatory implications.

The WG4 members have started outlining a technical report to bring together all the use cases to discuss the feasibility study, and ABSOLUTE partners participated to the WG4 conference-call and also agreed to contribute to developing the Technical Report as official contributors. Further, an agreement has been reached to present the ABSOLUTE project scenarios and user requirements study at the WG#4 meeting scheduled in December 12-13, at Mainz, Germany.

The TC RRS also liaise with TC ERM in horizontal radio issues and with other “radio” ETSI TBs (e.g. with TC ATTM, BRAN, DECT, TETRA, RT, MSG, ITS, etc.), 3GPP and other SDOs, as appropriate, on system level aspects. In coordination with ERM, TC RRS also liaise with ECC on spectrum matters arising from the use of Reconfigurable Radio Systems. This is also an opportunity for ABSOLUTE to follow relevant regulatory and spectrum related discussions and decisions taking place within the context of ECC.

ETSI SC Emergency Telecommunications (EMTEL): The SC EMTEL follows closely with the 3GPP in its work on the new generation of public safety systems which use LTE as a replacement for Terrestrial Trunked Radio (TETRA). SC EMTEL is currently reviewing the work of 3GPP to provide

specific European use cases. Following the SC work and whenever possible presenting the scenarios and architecture for ABSOLUTE will ensure that the project concepts will get visibility across different TGs addressing PPDR and security issues. The project partners are monitoring closely the activity within the SC, and will contribute to the group at the earliest opportunity presented to the project. This activity is expected to continue in 2014.

ETSI TC on SES (Satellite Earth Stations and Systems): ETSI SES is responsible for standardisation relating to all types of satellite communication systems, services and applications including fixed, mobile and broadcasting; satellite navigation systems and services; all types of earth stations and earth station equipment, especially the radio frequency interfaces and network and/or user interfaces; and protocols implemented in earth stations and satellite systems. In particular the WG on SCN (Satellite Communications and Navigation) and SatEC (Satellite Emergency Communications) are followed closely by ABSOLUTE partners, and is identified as potential candidate SDO for ABSOLUTE technical results. The SCN working group recently published two ETSI Technical Reports (TRs) on satellite navigation: one on Global Navigation Satellite Systems (GNSS)-based applications and standardisation needs, and the other on GNSS receiver's reference performances and interference mitigation capability. Building on these, four ETSI Technical Specifications (TSs) are currently being developed. The revision of S-MIM specification for messaging services in the S-band is a possible contribution depending on the available opportunities within the WG. Further, the Working Group is also looking at several new subjects: Cognitive Radio techniques for satellite communications, the environmental impact of satellite broadband networks, and hybrid satellite/terrestrial network architecture for high speed broadband access.

The WG on satellite emergency communications (SatEC) is looking at satellite emergency communication resources, followed by other standards on the use of satellites for different types of emergency scenarios. From ABSOLUTE, based on the activities related to the satellite backhaul, there are possibilities for contributions to potential revisions of TR 103 166 (Emergency Communication Cell over Satellite).

From ABSOLUTE, a presentation of the project goals and in particular, the S-MIM and satellite backhaul link advancements were discussed early during the project (ref. Table 3-2), and the partners are following the progress within the WG to identify any opportunities for contributions.

3.1.3 IEEE

IEEE P1900: The IEEE P1900 Standards Committee, DySPAN-SC's predecessor, was established in the 2005 and in 2007, where the scope of the DySPAN-SC includes the following:

- Dynamic spectrum access radio systems and networks with the focus on improved use of spectrum,
- New techniques and methods of dynamic spectrum access including the management of radio transmission interference, and
- Co-ordination of wireless technologies including network management and information sharing amongst networks deploying different wireless technologies.

Two WGs of P1900 are in line with the technical dimensions of ABSOLUTE, which are 1900.6 WG on Working Group on Spectrum Sensing Interfaces and Data Structures for Dynamic Spectrum Access and other Advanced Radio Communication Systems and 1900.7 WG on White Space Radio where the

focus is on the definition of Radio Interface for White Space Dynamic Spectrum Access Radio Systems Supporting Fixed and Mobile Operations.

For both these WGs, public safety and emergency communications based scenarios are considered a priority. A contribution was made to P1900 (ref. Table 3-2) to include public safety use cases and scenarios, and to include the specific PS requirements within the P1900 priorities. The project partners are following the progress within the standard, in particular, looking at opportunities to adapt the work related to LSA (Licensed Shared Access) for possibly synergies between public safety and commercial domains. In this regard, the activities in P1900.6 and P1900.7 WGs are being closely monitored and an action plan has been put in place to identify the appropriate synergies and to extend the requirements draft currently studied within the standard.

4 Conclusions

The deliverable presented the dissemination and standardization activities of the ABSOLUTE project during the first reporting period. The dissemination activities were carefully planned so as not to limit the achievements to scientific excellence, but also to make sure the results and innovative aspects of the project the wider scientific community through targeted events, invited speeches etc. Such exercise enabled the project to be visible among the wider community not only dealing with the public safety domain, but rather the industry and research community building the future mobile broadband infrastructures through 5G technologies. It is apparent that 5G technologies will consider public safety and PPDR technologies as an integrated part of the 5G system, and ABSOLUTE will have a major role to play in shaping this future. The broader dissemination and cooperation with the scientific community has been a useful exercise during this first year of the project.

The standardization activities described the contributions that were already made to the identified SDOs of interest for ABSOLUTE. The partners are closely following the standardization action plan and are committed to identify opportunities and present contributions to the different WGs. However, we are still at an early stage in ABSOLUTE with respect to the availability of all the technical aspects, and further refinement and variations to the standardisation plan to suit the project objectives and goals will be made during the second reporting period.

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