

Workshop W8

Deployment perspectives of Physical Layer Security into wireless public RATs

In conjunction with the 27th Annual IEEE International Symposium on Personal, Indoor, and Mobile Radio Communications (PIMRC'2016)

Sunday, September 4th, 2016 - 9h00 – 12h50

Valencia Congress Centre, Valencia, SPAIN

This workshop is supported by the Phylaws project (FP7-ICT-2011-8; Id 317562)

- **Background, Motivation and Goals**

Following the [PIMRC 2013's Special Technical Session on Physical Layer Security \(Physec\)](#) which dealt with academic researches on Secret Key Generation and Secrecy coding, and the [ICC2015 Workshop](#) which presented tutorials on Physec, new academic results and first pre-industrial developments, the purpose of this workshop is to focus on advanced academic researches industrial development and standardization perspectives of key-free security and privacy schemes for future wireless systems such as IMT 2020 (5G), Machine to Machine (M2M) and Internet of Things (IoT), as a complement of existing SIM/UIM-based protections. Moreover, the workshop will highlight recent progresses towards practical implantation of security schemes based on the use of propagation randomness into radio-communication nodes and terminals.

These half day workshop will start by a first session (including one introduction keynote) that will highlight recent theoretical and experimental results of Physec, by shaking academic and stakeholders' points of view. Then, during a second session, it will focus on new practical tracks towards implementation of secure pairing, authentication, integrity and confidentiality schemes supported by Physec concepts

- secret key generation (SKG) from extracted radio channel randomness,
- Artificial Noise (AN) and Beam-Forming (BF) enhanced with Secrecy Coding (SC),
- secure pairing (SP) by using Tag Signals (TSs) under beacon carriers or signalling messages,

The talks will be issued from academic and industrial collaboration into funded European projects and from developments and experiments of stakeholders and manufacturers. This second session will be concluded by a second keynote dealing with implantation perspectives of physec schemes and the point of view of stakeholders and manufacturers.

Workshop W8 - Programm

Deployment perspectives of Physical Layer Security into wireless public RATs

9h00 – Welcome - Introduction - by F.Delaveau, Thales Communications and Security, France

9h15 - Session 1 - Chaired by Dr Arsenia Chorti, University of Essex (achorti@essex.ac.uk)

About new academic and experimental results on Physsec schemes

Introducing Keynote 1, by Dr Arsenia Chorti, University of Essex (30' talk + 5' questions)

About the State of the art of Physsec.

Paper 1: (20' talk + 5' questions)

“Secure Compute-and-Forward Transmission With Artificial Noise and Full-Duplex Devices” by Pr Stefano Tomasin, University of Padova.

Speaker: Stefano Tomasin tomasin@dei.unipd.it

Paper 2: (20' talk + 5' questions)

“Semi-orthogonal selection for secure multiuser MISO communication systems with quantized feedback” by Berna Ozbek and Ozgecan Ozdogan (Izmir Institute of Technology, Izmir) and Gunes, Karabulut Kurt (Istanbul Technical University, Istanbul).

Speaker: Berna Ozbek bernaozbek@iyte.edu.tr.

10h40 - Pause 30' – Test bed presentation and demo in the WS room

11h00 - Session 2 - Chaired by Pr S. Tomasin. University of Padova (tomasin@dei.unipd.it)

About the implantation perspectives of physsec schemes.

Paper 3: (20' talk + 5' questions)

“RECIp: Wireless Channel Reciprocity Restoration Method for Varying Transmission Power”, by Gerhard Wunder, Rick Fritschek, Khan Reaz (Heisenberg Communications and Information Theory Group Freie Universität Berlin)

Speaker: Gerhard Wunder wunder@zedat.fu-berlin.de

Invited paper 4: (20' talk + 5' questions)

“Implantation and simulation of Physsec security schemes into LTE cellular links – results and relevant standardization perspectives”, by Adrian Kotelba and Sandrine Boumard (VTT- Oy Finland).

Speaker: Adrian Kotelba Adrian.Kotelba@vtt.fi

Invited paper 5: (20' talk + 5' questions)

“Implantation and experimentation of Physsec security schemes into Wifi radio links – results and relevant standardization perspectives”, by Nir Shapira (Celeno Communications Ltd Israel), Christiane Kameni, Renaud Molière François Delaveau (ThalesCommunications and Security, France).

Speaker: Nir Shapira Nir.Shapira@celeno.com

.Concluding Keynote 2, by Pr Stefano Tomasin, university of Padova (30' talk + 4')

“Experiments and implementations of physical layer security schemes”

12h50 – Conclusion - by F.Delaveau, Thales Communications and Security, France (1')

Organizers, Authors and Speaker

Organization:

François Delaveau: François Delaveau received MSc degrees from ENSTA, Paris, France, in 1987, and from Mathematics University (maîtrise Paris VII - 1988; agrégation - 1990). He has shared several industrial activities (sensor development, marketing support, project management, laboratory head and researches in various domains: firstly radar, sonar and acoustic sensors; then, inside Thales company, radio-communications (spectrum monitoring, smart antennas, anti-jammed modems, high resolution direction finders, comint sensors, passive radars - Thales award 2007). Besides his expertise and author activities (more than 50 papers, tutorials and patents, several ITU-R recommendations), he currently coordinates the PHYLAWS project (www.phylaw-ict.org), which is dedicated to the practical implantations of security schemes based on physical layer security concepts into public RATs. Email = Francois.delaveau@thalesgroup.com

Chair :

Arsenia Chorti: Arsenia Chorti obtained an M.Eng. degree in EEE from the University of Patras (Greece) and a D.E.A. degree in Electronics at the University Pierre et Marie Curie - Paris VI (France). In November 2005 she obtained her Ph.D. in EE from Imperial College London (UK). She undertook post-doctoral positions at the Universities of Southampton (UK), TCU (Greece) and UCL (UK), between 2005 and 2008. She has served as a Senior Lecturer in Communications at Middlesex University (UK) from December 2008 to April 2010. Between 2010 and 2013 she was a Marie Curie IOF researcher at Princeton University (US) and ICS-FORTH (Greece). Since October 2013 she holds a Lecturer position in Communications and Networks at CSEE University of Essex (UK) and is a visiting research collaborator at Princeton University. Her research interests span the areas of stochastic signal processing, communications and information theory. Dr. Chorti is a chartered engineer from the Technical Chambers of Greece since 2007. Email = achorti@essex.ac.uk

Stefano Tomasin: Stefano Tomasin received the Ph.D. degree in Telecommunications Engineering from the University of Padova, Italy, in 2003. He joined University of Padova where he is now Associate Professor. In the second half of 2004 he was visiting faculty at Qualcomm, San Diego (CA). In 2007 he has been visiting Polytechnic University in Brooklyn, NY. From December 2014 to December 2015, he has been on a sabbatical leave as Principal Engineer at the Mathematical and Algorithmic Sciences Laboratory, France Research Center of Huawei Technologies, in Boulogne-Billancourt, France. His current research interests include physical layer security, signal processing for wireless communications, optimization techniques for smart grids, synchronization, scheduling of communication resources. Email = tomasin@dei.unipd.it

Session 1:

Stefano Tomasin: See above

Berna Ozbek: Berna Ozbek is completed her PhD studies on 2004. Afterwards, she received a scholarship and worked as a postdoctoral researcher at CNAM-Paris on 2005. She was awarded as a Marie-Curie Intra-European (EIF) Fellow by European Commission for two years in the project entitled Interference Management Techniques for Multicell Networks on 2010. Currently, she holds an Assistant Professor position in Telecommunication field at the Electrical and Electronics Engineering Department of İzmir Institute of Technology, Turkey and is working in the field of wireless communication systems for more than fifteen years. She has published more than 100 scientific papers at high quality journals and conferences and one book. Email = bernaozbek@iyte.edu.tr

Gerhard Wunder: Gerhard Wunder (IEEE Senior Member, Editor IEEE TWC) studied electrical engineering at the University of Hannover, Germany, and the Technical University (TU) Berlin, Germany, and received his graduate degree in electrical engineering (Dipl.-Ing.) with highest honors in 1999. He received the PhD degree (Dr.-Ing.) in communication engineering with distinction (summa cum laude) in 2003 from TU Berlin and became a research group leader at the Fraunhofer Heinrich-Hertz-Institut in Berlin. In 2007, he also received the habilitation degree and became a Privatdozent at the TU Berlin. Very recently, he has become Heisenberg Fellow, granted for the first time to a communication engineer, and heads now the Heisenberg Communications and Information Theory Group at the FU Berlin. He is coordinator both of the EU project 5GNOW (5gnow.eu) and the German BMBF PROPHYLAXE (ict-prophylaxe.de) on IoT physical layer security as well as a member of the PMT of FANTASTIC-5G (fantastic5g.eu). Email = wunder@zedat.fu-berlin.de

Session 2:

Adrian Kotelba: Dr. Adrian Kotelba is a Senior Scientist for VTT Technical Research Centre of Finland. His personal interests include communications theory, adaptive signal processing, adaptive modulation and coding, cross-layer design, cryptography, and physical layer security. He has participated in a number of research projects related to modeling of wireless multi-antenna channels, multimedia transmission in cellular networks, adaptive radio resources allocation and adaptive signal processing, including adaptive compensation of nonlinear amplifiers, and security of wireless networks. Dr. Kotelba received his M.Sc. degree in electrical engineering from Poznan University of Technology, Poland and Ph.D. degree in telecommunications from University of Oulu, Finland. Email = Adrian.Kotelba@vtt.fi

Nir Shapira: Nir Shapira received a B.Sc. in EE and Physics (summa cum laude) from the Technion, Israel's Institute of Technology, and an MBA from the Tel-Aviv University. He joined Celeno from the day of its inception and was responsible for forming the technological infrastructure and intellectual property of the company. He also represents Celeno in IEEE 802.11 standardization activities. Prior to joining Celeno, Nir held various managerial roles in Conexant, developing state-of-the-art wireless, DSL and voice band communication technologies. He served in an elite R&D unit of the IDF. Email = Nir.Shapira@celeno.com

Note about timing and organization

Starting hour: 9h00

General introduction: 15'

Keynotes 1 and 2: 30' + 5' questions

Papers 1 to 5: 20' + 5' questions

Pause: 20'

General conclusion: 1'

Total time duration of the session 1: 1h25

Total time duration of the session 2: 1h49

Total time duration (intro + session 1 + pause + session 2 + conclusion): 3h50

Ending hour: 12h50.