

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison

Lancaster University, Lancaster, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Friedemann Mattern

ETH Zurich, Zurich, Switzerland

John C. Mitchell

Stanford University, Stanford, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

TU Dortmund University, Dortmund, Germany

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Gerhard Weikum

Max Planck Institute for Informatics, Saarbrücken, Germany

More information about this series at <http://www.springer.com/series/7410>

Pooya Farshim · Emil Simion (Eds.)

Innovative Security Solutions for Information Technology and Communications

10th International Conference, SecITC 2017
Bucharest, Romania, June 8–9, 2017
Revised Selected Papers

Editors

Pooya Farshim
École Normale Supérieure
Paris
France

Emil Simion
Polytechnic University of Bucharest
Bucharest
Romania

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-319-69283-8 ISBN 978-3-319-69284-5 (eBook)
<https://doi.org/10.1007/978-3-319-69284-5>

Library of Congress Control Number: 2017956772

LNCS Sublibrary: SL4 – Security and Cryptology

© Springer International Publishing AG 2017

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

This volume contains the papers presented at SecITC 2017, the 10th International Conference on Security for Information Technology and Communications (www.secitc.eu), held during June 8–9, 2017, in Bucharest. There were 22 submissions and each submitted paper was reviewed by at least three Program Committee members. The committee decided to accept seven papers (one paper was withdrawn by the authors, after the conference, from the LNCS volume) as well as a further seven invited speakers. For ten years SecITC has been bringing together computer security researchers, cryptographers, industry representatives, and graduate students. The conference focuses on research on any aspect of security and cryptography. The papers present advances in the theory, design, implementation, analysis, verification, or evaluation of secure systems and algorithms. One of SecITC’s primary goals is to bring together researchers belonging to different communities and provide a forum that facilitates the informal exchanges necessary for the emergence of new scientific collaborations. We would like to acknowledge the work of the Program Committee, whose great efforts provided a proper framework for the selection of the papers. The conference was organized by Advanced Technologies Institute, Bucharest University of Economic Studies and Military Technical Academy.

July 2017

Pooya Farshim
Emil Simion

Foreword

It is a privilege for me to write the foreword to the proceedings to this 10th anniversary of the conference. Indeed, SECITC 2017 is the 10th edition of the International Conference on Information Technology and Communication Security held in Bucharest, Romania every year.

Throughout the years, SECITC has become a truly competitive publication venue with an acceptance rate of 1/3, an Program Committee of 50 experts from 20 countries and a long series of distinguished invited speakers. Since three years the conference proceedings are published in Springer's Lecture Notes in Computer Science, and articles published in SECITC are indexed in most science databases.

The conference is unique in that it serves as an exchange forum between confirmed researchers and students entering the field as well as industry players.

I would like to particularly thank the PC chairs Pooya Farshim and Emil Simion for an outstanding paper selection process conducted electronically. In response to the call for papers the Program Committee got 22 submissions of which seven were chosen. To those the PC added seven invited keynote lectures by Sylvain Guilley, Konstantinos Markantonakis, Claudio Orlandy, Peter Ryan, Ferucio-Laurentiu Tiplea, Damien Vergnaud, and myself.

I also warmly thank the conference's Organization Committee and Technical Support Team Mihai Doinea, Cristian Ciurea, Luciana Morogan, Andrei-George Oprina, Marius Popa, Mihai Pura, Mihai Togan, and Marian Haiducu for their precious contribution to the success of the event and for their dedication to the community.

I am certain that in the coming years SECITC will continue to grow and expand into a major cryptography and information security venue making Bucharest a traditional summertime scientific meeting habit to the IT security research community.

August 2017

David Naccache

Organization

Program Committee

| | |
|-------------------------------|--|
| Elena Andreeva | COSIC, KU Leuven, Belgium |
| Ludovic Apvrille | Telecom ParisTech, France |
| Gildas Avoine | INSA Rennes, France; UCL, Belgium |
| Manuel Barbosa | HASLab - INESC TEC and FCUP |
| Ion Bica | Military Technical Academy, Romania |
| Catalin Boja | Bucharest Academy of Economic Studies, Romania |
| Sanjit Chatterjee | Indian Institute of Science, India |
| Liqun Chen | University of Surrey, UK |
| Christophe Clavier | Université de Limoges, France |
| Paolo D'Arco | University of Salerno, Italy |
| Joan Daemen | STMicroelectronics and Radboud University in Nijmegen, The Netherlands |
| Roberto De Prisco | University of Salerno, Italy |
| Eric Diehl | Sony Pictures, USA |
| Itai Dinur | Ben-Gurion University, Israel |
| Stefan Dziembowski | University of Warsaw, Poland |
| Pooya Farshim | ENS, France |
| Bao Feng | Huawei, China |
| Eric Freysinet | LORIA, France |
| Nicolas Gama | University of Versailles, France |
| Helena Handschuh | COSIC, KU Leuven, Belgium |
| Shoichi Hirose | University of Fukui, Japan |
| Xinyi Huang | Fujian Normal University, China |
| Miroslaw Kutylowski | Wroclaw University of Technology, Poland |
| Jean-Louis Lanet | Inria-RBA, France |
| Giovanni Livraga | Università degli Studi di Milano, Italy |
| Konstantinos Markantonakis | ISG-Smart Card Centre, Founded by Vodafone, G&D and the Information Security Group of Royal Holloway, University of London, UK |
| Florian Mendel | TU Graz, Austria |
| Bart Mennink | Digital Security Group, Radboud University, Nijmegen, The Netherlands |
| Kazuhiko Minematsu | NEC Corporation, Japan |
| David Naccache | ENS, France |
| Rene Peralta | NIST, USA |
| Bart Preneel | KU Leuven COSIC and iMinds, Belgium |
| Reza Reyhanitabar | NEC Laboratories Europe, Germany |
| P.Y.A. Ryan | University of Luxembourg, Luxembourg |

| | |
|--------------------------|--|
| Damien Sauveron | XLIM, UMR University of Limoges/CNRS 7252, France |
| Emil Simion | University Politehnica of Bucharest, Romania |
| Agusti Solanas | Smart Health Research Group, Rovira i Virgili University, Spain |
| Rainer Steinwandt | Florida Atlantic University, USA |
| Willy Susilo | University of Wollongong, Australia |
| Ferucio Laurentiu Tiplea | Alexandru Ioan Cuza University of Iasi, Romania |
| Mihai Togan | Military Technical Academy, Romania |
| Cristian Toma | Bucharest Academy of Economic Studies, Romania |
| Denis Trcek | University of Ljubljana, Slovenia |
| Michael Tunstall | Cryptography Research, USA |
| Victor Valeriu | Military Technical Academy, Romania |
| Serge Vaudenay | EPFL, Switzerland |
| Ingrid Verbauwhede | ESAT - COSIC, Belgium |
| Guilin Wang | Huawei International Pte. Ltd., China |
| Qianhong Wu | Beihang University, China |
| Lei Zhang | East China Normal University, China |

Additional Reviewers

Balasch, Josep
 Balli, Fatih
 Bogos, Sonia
 Chen, Siyuan
 Li, Jiangtao
 Li, Letitia
 Li, Yanan
 Lugou, Florian
 Maimut, Diana
 Slowik, Marcin
 Unterluggauer, Thomas
 Werner, Mario
 Wszola, Marta
 Zhang, Wentao

Contents

| | |
|---|-----|
| Faster Zero-Knowledge Protocols and Applications (Invited Talk Abstract). | 1 |
| <i>Claudio Orlandi</i> | |
| Stochastic Side-Channel Leakage Analysis <i>via</i> Orthonormal Decomposition . . . | 12 |
| <i>Sylvain Guilley, Annelie Heuser, Tang Ming, and Olivier Rioul</i> | |
| Key-Policy Attribute-Based Encryption from Bilinear Maps | 28 |
| <i>Ferucio Laurențiu Țiplea, Constantin Cătălin Drăgan, and Anca-Maria Nica</i> | |
| Security of Pseudo-Random Number Generators with Input (Invited Talk) | 43 |
| <i>Damien Vergnaud</i> | |
| Securing the Foundations of Democracy | 52 |
| <i>Peter Y.A. Ryan</i> | |
| Exploring Naccache-Stern Knapsack Encryption | 67 |
| <i>Éric Brier, Rémi Géraud, and David Naccache</i> | |
| Proximity Assurances Based on Natural and Artificial Ambient Environments | 83 |
| <i>Iakovos Gurulian, Konstantinos Markantonakis, Carlton Shepherd, Eibe Frank, and Raja Naeem Akram</i> | |
| Challenges of Federating National Data Access Infrastructures | 104 |
| <i>Margus Freudenthal and Jan Willemson</i> | |
| Strongly Deniable Identification Schemes Immune to Prover's and Verifier's Ephemeral Leakage. | 115 |
| <i>Łukasz Krzywiecki and Marcin Słowik</i> | |
| Evolution of the McEliece Public Key Encryption Scheme. | 129 |
| <i>Dominic Bucerzan, Vlad Dragoi, and Hervé Talé Kalachi</i> | |
| New Algorithm for Modeling S-box in MILP Based Differential and Division Trail Search. | 150 |
| <i>Yu Sasaki and Yosuke Todo</i> | |

| | |
|--|-----|
| Secretly Embedding Trapdoors into Contract Signing Protocols | 166 |
| <i>Diana Maimuț and George Teșeleanu</i> | |
| On a Key Exchange Protocol | 187 |
| <i>Mugurel Barcau, Vicențiu Pașol, Cezar Pleșca, and Mihai Togan</i> | |
| Author Index | 201 |