

2025 Security for Space Systems (3S 2025)

**Noordwijk, Netherlands
4-6 November 2025**



**IEEE Catalog Number: CFP25UJ6-POD
ISBN: 979-8-3315-6088-1**

**Copyright © 2025, European Space Agency (ESA)
All Rights Reserved**

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP25UJ6-POD
ISBN (Print-On-Demand):	979-8-3315-6088-1
ISBN (Online):	978-9-090-41028-9

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

A Satellite Constellation Simulator for SpaceSystems Cybersecurity Research and Development	1
<i>Simone Urbano, Jacques Girard, Louis Lolive, Vincent Nicomette, Pierre Bacquet, Patrick Hebrard, Guillaume Auriol, Ludovic Cintrat, Benjamin Deporte, Julien Airaud, Matteo Merialdo</i>	
Secure Satellite Software-Defined Payloads With High-Assurance Post-Quantum Cryptography	10
<i>Karthikeyan Bhargavan, Thomas Gazagnaire, Franziskus Kiefer, Virgile Robles</i>	
Eavesdropping of Terahertz RIS-Enabled HAPS-Integrated Satellite Communication	15
<i>Daan van der Eijk, Simone Soderi, Mauro Conti</i>	
An End-to-End GEO Satellite Links Simulation Framework for Cyber Range Applications	26
<i>Alessandro Santorsola, Daniele Mammone, Stefano Longari, Francesco Topputo, Matteo Merge</i>	
Hybrid Modular Hardware-Software Solution for Securing Ground-Satellites Communication	37
<i>Enrico Petraglio, Yorick Brunet, Pascal Perrenoud, Clement Dieperink, Yoan Graf, Anthony Convers, Anthony Jaccard, Yann Thoma</i>	
Inherent Vulnerabilities in Hybrid CDMA & Cryptographic Spread Spectrum for Space Systems	43
<i>Edd Salkield, Sebastian Kohler, Simon Birnbach, Ivan Martinovic</i>	
Decimated in Linear Time; Single Power Trace, Full Key Recovery Attack on Toeplitz Hash Privacy Amplification.....	53
<i>Niall Canavan, Tuan Hoang, Ayesha Khalid, Maire O'Neill</i>	
Towards Minimal Certificates for Federated Space Public Key Infrastructure	60
<i>Alin-Petru Rosu, Oana-Alexandra Graur</i>	
On the Privacy of LEO Two-Way-Ranging.....	72
<i>Daniele Coppola, Harshad Sathaye, Giovanni Camurati, Srđjan Capkun</i>	
Simulating and Observing Satellite Threats: A Monitoring-Aware Cyber Range for Satellite Security Training	78
<i>Lorenzo Bracciale, Matteo Ciccaglione, Alessandro Amici, Fabio Patrone, Nour Badini, Mario Marchese, Andrea Detti, Daniel Xhakalliu, Giuseppe Bianchi, Michele Luglio, Luca Fiscariello, Cesare Roseti, Arianna Miraval, Pierpaolo Loreti</i>	
E-Laun: OTAR Resistant to Evil Launchers.....	88
<i>Alexandre Duc, Gregoire Guyot, Pascal Perrenoud</i>	
Efficient PKI Design for Secure Communication and Collaboration in Space Networks	94
<i>David Koisser, Albert Schwarzkopf, Ferdinand Brassler, Giacomo Da Broi</i>	
Semantic-Aware Anomaly Detection for Satellite-IoT Networks: A Lightweight Transformer-Based Approach	106
<i>Junbeom Park, Zizung Yoon, Taehoon Eom, Jongsou Park</i>	
End-to-End Quantum-Safe Security for Satellite Data Links (E2EQSS)	116
<i>Christoph Wildfeuer, Timeo Jauslin, Alain Lavoyer, Milenko Starcik, Afonso Serra, Laszlo Etesi, Valentina Tamburello, Bruno Huttner</i>	

AegisSat: Securing AI-Enabled SoC FPGA Satellite Platforms.....	121
<i>Huimin Li, Vusal Novruzov, Nikhilesh Singh, Lichao Wu, Mohamadreza Rostami, Ahmad-Reza Sadeghi</i>	
Securing Satellite Key Distribution via Covert Channels: A Cooperative Jamming and Watermarking Approach.....	134
<i>Simone Soderi, Enirco Casini, Mauro Conti</i>	
Differential Testing of Bundle Protocol v7 Implementations: A Preliminary Report.....	147
<i>Stephan Havermans, Lars Baumgartner, Marcus Wallum, Juan Caballero</i>	
DSNS: The Deep Space Network Simulator	153
<i>Joshua Smailes, Filip Futera, Sebastian Kohler, Simon Birnbach, Martin Strohmeier, Ivan Martinovic</i>	
Crypto Agility Definitions for Space Systems.....	165
<i>Jannik Mahn, Matthias Muller, Karin Zielinski</i>	

Author Index