

2019 11th International Conference on Cyber Conflict (CyCon 2019)

**Tallinn, Estonia
28-31 May 2019**



**IEEE Catalog Number: CFP1926N-POD
ISBN: 978-1-7281-1724-9**

**Copyright © 2019, NATO CCD COE Publications, Tallinn
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:	CFP1926N-POD
ISBN (Print-On-Demand):	978-1-7281-1724-9
ISBN (Online):	978-9949-9904-5-0
ISSN:	2325-5366

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

Introduction	1
<i>For a Baltic Cyberspace Alliance?</i> Martin C. Libicki	9
<i>“Silent Battle” Goes Loud: Entering a New Era of State-Avowed Cyber Conflict</i> Keir Giles and Kim Hartmann	23
<i>Call to Action: Mobilizing Community Discussion to Improve Information-Sharing About Vulnerabilities in Industrial Control Systems and Critical Infrastructure</i> Daniel Kapellmann and Rhyner Washburn	37
<i>Hidden Risks to Cyberspace Security from Obsolete COTS Software</i> Bariş Egemen Özkan and Serol Bulkan	61
<i>Applying Indications and Warning Frameworks to Cyber Incidents</i> Bilyana Lilly, Quentin Hodgson, Lillian Ablon and Adam Moore	81
<i>Recommendations for Enhancing the Results of Cyber Effects</i> Erwin Orye and Olaf Maennel	103
<i>Rough-and-Ready: A Policy Framework to Determine if Cyber Deterrence is Working or Failing</i> Jason Healey and Neil Jenkins	123
<i>The All-Purpose Sword: North Korea’s Cyber Operations and Strategies</i> Ji Young Kong, Kyoung Gon Kim and Jong In Lim	143
<i>NATO Members’ Organizational Path Towards Conducting Offensive Cyber Operations: A Framework for Analysis</i> Max Smeets	163
<i>What are Military Cyberspace Operations Other Than War?</i> Brad Bigelow	179

<i>Covert or not Covert: National Strategies During Cyber Conflict</i> Gil Baram and Udi Sommer	197
<i>The Cyber-ASAT: On the Impact of Cyber Weapons in Outer Space</i> James Pavur and Ivan Martinovic	213
<i>Challenges and Opportunities to Counter Information Operations Through Social Network Analysis and Theory</i> Alicia Bargar, Janis Butkevics, Stephanie Pitts and Ian McCulloh	231
<i>Understanding the Strategic Implications of the Weaponization of Artificial Intelligence</i> Joe Burton and Simona R. Soare	249
<i>Hidden in the Shadow: The Dark Web – A Growing Risk for Military Operations?</i> Robert Koch	267
<i>SamSam and the Silent Battle of Atlanta</i> Kenneth Kraszewski	291
<i>The Contours of ‘Defend Forward’ Under International Law</i> Jeff Kosseff	307
<i>The Rise of the Regionals: How Regional Organisations Contribute to International Cyber Stability Negotiations at the United Nations Level</i> Nikolas Ott and Anna-Maria Osula	321
<i>Layered Sovereignty: Adjusting Traditional Notions of Sovereignty to a Digital Environment</i> Przemysław Roguski	347
<i>The Sound of Silence: International Law and the Governance of Peacetime Cyber Operations</i> Barrie Sander	361

<i>Addressing Adversarial Attacks Against Security Systems Based on Machine Learning</i> Giovanni Apruzzese, Michele Colajanni, Luca Ferretti and Mirco Marchetti	383
<i>Machine Learning-based Detection of C&C Channels with a Focus on the Locked Shields Cyber Defense Exercise</i> Nicolas Känzig, Roland Meier, Luca Gambazzi, Vincent Lenders and Laurent Vanbever	401
<i>Neural Network-Based Technique for Android Smartphone Applications Classification</i> Roman Graf, Ross King and Aaron Kaplan	421
<i>Cyber-Physical Battlefield Platform for Large-Scale Cybersecurity Exercises</i> Joonsoo Kim, Kyungho Kim and Moonso Jang	439
<i>Resilience of Cyber-Physical Systems: an Experimental Appraisal of Quantitative Measures</i> Giuseppina Murino, Alessandro Armando and Armando Tacchella	459
<i>Detection of Malicious Remote Shell Sessions</i> Pierre Dumont, Roland Meier, David Gugelmann and Vincent Lenders	479
<i>BlackWidow: Monitoring the Dark Web for Cyber Security Information</i> Matthias Schäfer, Martin Strohmeier, Marc Liechti, Markus Fuchs, Markus Engel and Vincent Lenders	499
<i>Towards Measuring Global DDoS Attack Capacity</i> Artūrs Lavrenovs	521
<i>Silent Battles: Towards Unmasking Hidden Cyber Attack</i> Robert Koch and Mario Golling	537
Biographies	557