

IEEE ComSoc SPCC Technical Committee Meeting

Ana Garcia Armada (Chair)

Dec. 9, 2024

SPCC TC Meeting Agenda

- Welcome & Introduction
- Approval of agenda
- Approval of last meeting minutes
- Brief report about the SPCC TC activities
- Presentation of SPCC Awards TC 2024
- Presentation of the award to the winners of SPCC TC Student Challenge and Video Contest
- Invited Talk by Andrea Conti
- Any Other Business

- Approval of agenda

- Approval of last meeting minutes:

<https://spcc.committees.comsoc.org/meeting-reports/>

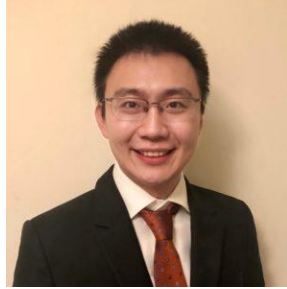
Current SPCC Officers (2024-2025)

<http://spcc.committees.comsoc.org/officers/>

- ▶ **Chair:** Ana Garcia Armada, Universidad Carlos III de Madrid, Spain
- ▶ **Vice-Chair:** Yuanwei Liu, Queen Mary University of London, UK
- ▶ **Secretary:** Fang Fang, Western University, Canada
- ▶ **Standards Liaison:** Ruiqi (Richie) Leo, ZTE Corporation, China
- ▶ **Newsletter Editor:** Roberto Corvaja, University of Padova, Italy
- ▶ **Student Competition Representative:** Rui Dinis, Univ. Nova Lisboa, Portugal
- ▶ **SIG Coordinator:** Melda Yuksel, Middle East Technical University, Turkey
- ▶ **Public Engagement & Social Networks Coordinator:** Xidong Mu, Queen Mary University of London, UK
- ▶ **WICE/YP Liaison:** Leyi Zhang, ZTE Corporation, China

Current SPCC Officers (2024-2025)

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Procedure for nomination of DLs and symposium chairs

- Online form for nomination of DLs:
 - <https://form.jotform.com/241514210947047>
- Online form for nomination of symposium chairs:
 - ▶ <https://form.jotform.com/241514072989059>

SPCC TC Newsletter

Newsletter Editor: Roberto Corvaja

Latest issues available at:

<https://spcc.committees.comsoc.org/newsletter/>

Social Media

Public Engagement & Social Networks Coordinator: Xidong Mu

SPCC-TC LinkedIn Page

<https://www.linkedin.com/company/ieee-comsoc-spcc-technical-committee/about/?viewAsMember=true>

- SPCC-TC WeChat Public Account (Scan the QR code to follow in the WeChat)



TPC Reports (GC'24 SPC Symposium)

▶ Co-Chairs:

- **Zhijin Qin** (Tsinghua University, China) (Chair) (**SPCC TC Representative**)
- Himal A Suraweera (University of Peradeniya, Sri Lanka)

▶ Submissions: 127

▶ Review process: Finished, 99 TPC members

▶ Accepted papers: 51

▶ Acceptance rate: 40.15%

▶ Number of sessions: 10

TPC Reports (GC'24 RIS-SAC)

- ▶ **Co-Chairs:**

- **Qingqing Wu** (Shanghai Jiao Tong University, China) (**SPCC TC Representative**)

- ▶ **Submissions:** 74

- ▶ **Review process:** Finished, 106 TPC members

- ▶ **Accepted papers:** 29

- ▶ **Acceptance rate:** 39%

- ▶ **Number of sessions:** 5*5 + Interactive presentation format: 4 papers

TPC Reports (ICC'25 SPC Symposium)

▶ **Co-Chairs:**

- **Dimitrie C. Popescu** (Old Dominion University) (**SPCC TC Representative**)
- Yuan Shen (Tsinghua University, Beijing, China)
- Mojtaba Vaezi (Villanova University)

▶ **Submissions:** 126 papers submitted

▶ **Review process:** started on Nov. 12, 162 TPC members

▶ **Accepted papers:** TBD in January 2025 (acceptance notifications Jan. 17, 2025)

▶ **Acceptance rate:** TBD.

▶ **Number of sessions:** TBD.

TPC Reports (ICC'25 WC Symposium)

▶ **Co-Chairs:**

- Cunhua Pan (Southeast University)
- **Lin Bai** (Beihang University) (**SPCC TC Representative**)
- Haixia Zhang (Shandong University)
- Fang Fang (Western University)
- Mauro Biagi (Sapienza Università di Roma)

▶ **Submissions:** 307

▶ **Review process:** In process, 335 TPC members

▶ **Accepted papers:** TBD

▶ **Acceptance rate:** TBD

▶ **Number of sessions:** TBD

SIG reports

▶ SIGs

- SIG on Orthogonal Time Frequency Space (OTFS)
- SIG on Signal Processing Techniques for Next Generation Multiple Access (NGMA)
- SIG on REconFigurable Intelligent Surfaces for Signal Processing and CommunicatIONS (REFLECTIONS)
- SIG on Signal Processing Techniques in 6G Communication Systems
- SIG on Signal Processing Techniques for Big Data and Wireless Edge Intelligence
- SIG on Near Field Communications for Next Generation Mobile Networks

SIG on Near Field Communications for Next Generation Mobile Networks

- ▶ Chairs
 - Cunhua Pan, Southeast University, China
 - Keshav Singh, National Sun Yat-sen University Kaohsiung, Taiwan
- ▶ Tutorial on “Near-Field XL-MIMO Communication and Sensing Towards 6G: Opportunities and Challenges”
 - IEEE VTC 2024, 24 June, 2024
 - IEEE ICC 2024, Aug. 7, 2024
 - Changsheng You, Yong Zeng, Jiayi Zhang
- ▶ CFP at IEEE TCCN: <https://www.comsoc.org/publications/journals/ieee-tccn/cfp/machine-learning-and-intelligent-signal-processing-near-field>
- ▶ CFP at IEEE IoT journal: https://ieee-iotj.org/wp-content/uploads/2024/06/Near_Field_Communications.pdf
- ▶ CFP at IEEE IoT journal: https://ieee-iotj.org/wp-content/uploads/2024/11/6G_Near_Field.pdf
- ▶ IEEE ICC 2024 workshop: <https://sites.google.com/view/near-field-workshop-icc2024/首页>
- ▶ IEEE ICC 2024 Tutorial: <https://icc2024.ieee-icc.org/program/tutorials#t06>

SIG on Signal Processing Techniques for Big Data and Wireless Edge Intelligence

► Chairs:

- Jie Xu, University of Miami
- Mingzhe Chen, University of Miami

► Recent Past Conference & Journal Activities

- 2024 IEEE ICC Workshop on Edge Learning over 5G Mobile Networks and Beyond
- 2024 IEEE ICC Workshop on Integrated, Intelligent and Ubiquitous Connectivity for 6G and Beyond
- 2024 IEEE ICC Workshop on Next Generation Spectrum Sharing Technology
- 2024 IEEE WCNC Workshop on Integrated, Intelligent and Ubiquitous Connectivity for 6G and Beyond
- 2024 IEEE WCNC Workshop on Intelligent Computing and Caching at the Network Edge
- 2024 IEEE INFOCOM Workshop on Distributed Machine Learning and Fog Networks
- 2024 KDD Workshop on Mining and Learning from Time Series
- 2024 KDD Workshop on Reasoning and Planning with LLM for Code Development

SIG on Signal Processing Techniques for Big Data and Wireless Edge Intelligence

▸ Chairs:

- Jie Xu, University of Miami
- Mingzhe Chen, University of Miami

▸ Upcoming Conference & Journal Activities

- 2025 IEEE ICC Workshop on Positioning and Sensing Over Wireless Networks
- 2025 IEEE ICC Workshop on Digital Twins over NextG Wireless Networks
- 2025 IEEE INFOCOM Workshop on Digital Twins over NextG Wireless Networks
- 2025 ACM ASIACCS Workshop on Secure and Efficient Federated Learning

SIG on REconFigurabLE Intelligent Surfaces for Signal Processing and CommunicatiONS (REFLECTIONS)

▶ Chair:

- Alessio Zappone, University of Cassino and Southern Lazio

▶ Main activities

- Q. Wu, Track Chair of VTC 2025 Spring, Signal processing for wireless communications
- Q. Wu, Workshop Chair, IMT 2030 6G workshop on RIS, 2024 Oct. 24
- M. Flanagan, TPC Co-Chair for the Wireless Communications Symposium at IEEE ICC 2024
- M. Flanagan, TPC Co-Chair for Track 1 “Physical Layer and Communication Theory” at IEEE WCNC 2024.

▶ Workshops

- A. Zappone, Symposium co-chairing: Resource Allocation and Machine Learning @WCNC 2024
- M. Di Renzo, Workshop organization: Reconfigurable Intelligent and Holographic Surfaces for 6G @WCNC2024
- International workshop on: Reconfigurable Intelligent Surfaces, in Paris, February 22-23

(co-organized by M. Di Renzo / Talk by A. Zappone) Strong interaction and joint event organization with the ETI on Electromagnetic Signal and Information Theory (ESIT).

SIG on REconFigurabLE Intelligent Surfaces for Signal Processing and CommunicatiONS (REFLECTIONS)

▶ Chair:

- Alessio Zappone, University of Cassino and Southern Lazio

▶ Tutorials

- M. Di Renzo, Towards Integrated and Intelligent 6G: Key Synergies, Usage Scenarios and New Opportunities, GLOBECOM 2024
- M. Di Renzo, Intelligent Surfaces for Future Wireless Communications, @ IEEE MECOM 2025
- M. Di Renzo, Integrated Sensing & Communications with Intelligent Metasurfaces: Synergies for 6G & Beyond, @ IEEE MeditCom 2024
- M. Di Renzo, Synergizing Integrated and Intelligent 6G Connectivity using ISAC and RIS, @ VTC Spring
- M. Di Renzo, When the sensing sphere touches Communication and Electromagnetism: The academic, industrial and standard perspectives, @ ICC 2024

SPCC TC Awards 2024

**IEEE COMMUNICATIONS SOCIETY
SIGNAL PROCESSING AND COMPUTING FOR COMMUNICATIONS
TECHNICAL COMMITTEE**

2024 TECHNICAL RECOGNITION AWARD

PRESENTED TO

Andrea Conti

FOR CONTRIBUTIONS IN ADAPTIVE DIVERSITY COMMUNICATIONS AND NETWORK
LOCALIZATION AND NAVIGATION



IEEE COMMUNICATIONS SOCIETY
 SIGNAL PROCESSING AND COMPUTING FOR COMMUNICATIONS
 TECHNICAL COMMITTEE

2024 BEST PAPER AWARD

PRESENTED TO

**M.T. Mamaghani, X. Zhou, N. Yang,
 A. L. Swindlehurst, H. V. Poor**

FOR THE FOLLOWING PAPER:

“On the information leakage performance of secure finite blocklength transmissions over Rayleigh fading channels” IEEE ICC 2024

On the Information Leakage Performance of
 Secure Finite Blocklength Transmissions over
 Rayleigh Fading Channels

Milad Tatar Mamaghani*, Xiangyun Zhou*, Nan Yang*, A. Lee Swindlehurst[†], and H. Vincent Poor[‡]

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Abstract—This paper presents a secrecy performance study of a wiretap communication system with finite blocklength (FBL) transmissions over Rayleigh fading channels, based on the definition of an average information leakage (AIL) metric. We evaluate the exact and closed-form approximate AIL performance, assuming that only statistical channel state information (CSI) of the eavesdropping link is available. Then, we reveal an inherent statistical relationship between the AIL metric in the FBL regime and the commonly-used secrecy outage probability in conventional infinite blocklength communications. Aiming to improve the secure communication performance of the considered system, we formulate a blocklength optimization problem and solve it via a low-complexity approach. Next, we present numerical results to verify our analytical findings and provide various important insights into the impacts of system parameters on the AIL. Specifically, our results indicate that i) compromising a small amount of AIL can lead to significant reliability improvements, and ii) the AIL experiences a secrecy floor in the high signal-to-noise ratio regime.

Index Terms—Beyond-5G communications, physical-layer security, finite blocklength, performance analysis, fading channels.

I. INTRODUCTION

In today's interconnected world, wireless networks have permeated numerous applications, becoming an indispensable aspect of our lives. From safeguarding private information to powering essential services such as credit data, e-health records, or vital command and control messages, the significance of beyond-5G (B5G) wireless networks underscores the paramount need for robust security measures [2]. Thus, communication security has received considerable attention from both academia and industry, particularly at the physical layer. Physical-layer security (PLS) is a promising security candidate that exploits the distinct features and randomness of the transmission medium such as channel impairments, noise, or smart signaling to protect wireless transmissions. PLS can enhance confidentiality, decrease reliance on upper-layer cryptography, and ensure security without the need for sophisticated key-exchange procedures [3].

Conventional PLS developments have been centered around the idea of *secrecy capacity*, which refers to the maximum

An extended version of this work has been submitted [1].

achievable secure rate that guarantees both reliability and confidentiality over a wiretap channel. Wyner in [4] showed that by employing so-called wiretap coding, it is possible to concurrently minimize the decoding error probability at a legitimate receiver and reduce the information leakage to a malicious adversary to an arbitrarily low level with an infinitely long coding blocklength. Nevertheless, emerging scenarios in B5G wireless systems such as machine-type communication (MTC) require data traffic characterized by short packets in order to satisfy the broader communication requirements [5], [6]. The use of short packets calls for finite blocklength (FBL) analysis, as the traditional asymptotic analysis no longer holds in this regime. While leveraging FBL communication helps minimize end-to-end transmission latency due to a reduction in the number of channel uses, it generally comes with a decrease in channel coding gain, making it challenging to ensure communication reliability as well as secrecy. In addition, since wireless FBL communication scenarios cannot be accommodated by traditional PLS designs, which rely on the infinite blocklength (IBL) assumption, it is crucial to meticulously develop PLS schemes tailored to the specific requirements of the FBL regime.

Recently, some research has explored the limitations of FBL transmissions from different perspectives via information-theoretic approaches. Polyanskiy *et al.* in [7] addressed the problem of maximizing the channel coding rate in the FBL regime with given reliability constraints in general communication channels. This work urged the research community to further explore the characterization of non-asymptotic achievable rate regions in different non-security-based schemes [8] and security-based scenarios [9]–[12], to determine the practical impacts of FBL on wireless communications. In particular, the authors in [9] studied secure FBL communication for mission-critical Internet of Things (IoT) applications with an external eavesdropper. The work in [10] investigated secrecy performance in cognitive IoT with low-latency and security requirements. In [11], the design of a secure aerial communication system with FBL was considered to improve the average secrecy rate while meeting security and reliability requirements. In [12], the authors presented an analytical

**IEEE COMMUNICATIONS SOCIETY
SIGNAL PROCESSING AND COMPUTING FOR COMMUNICATIONS
TECHNICAL COMMITTEE**

2024 EARLY ACHIEVEMENT AWARD

PRESENTED TO

Cunhua Pan

FOR CONTRIBUTIONS IN TECHNOLOGICAL ADVANCEMENT OF SIGNAL
PROCESSING FOR COMMUNICATIONS



SPCC TC student challenge and contest (new)

- TC innovation project funded by IEEE ComSoc
 - ▶ We proposed a contest for student teams that involves:
 - innovative ideas and proposals to provide an answer to a **technical challenge**, to be chosen from a set
 - and the preparation of a video to present the proposal.
 - ▶ A jury of the IEEE SPCC TC has selected the set of finalist teams and one winner team after an Online workshop where 2 finalists presented their proposals

Question 4: Towards a greener and more energy efficient network, reconfigurable intelligent surfaces (RISs) are envisaged to be a promising 6G technology. Please identify one major challenge introduced to cellular networks in terms of signal processing after deploying RISs, and provide possible solutions.

Question 5: How can you use physical layer security techniques to address the security challenges in 6G?

Videos available here: <https://spcc.committees.comsoc.org/student-contest-information/>

Signal Processing and Computing for Communications (SPCC) Technical Committee



Student Challenge and Contest

Presented to

Yike Xie, Xin Wei, Dong Wang, Qiaoran Jia
University of Electronic Science and Technology of China

Question 4: Towards a greener and more energy efficient network, reconfigurable intelligent surfaces (RISs) are envisaged to be a promising 6G technology. Please identify one major challenge introduced to cellular networks in terms of signal processing after deploying RISs, and provide possible solutions

Invited talk

**"Location Awareness in Beyond 5G
Networks"
by Prof. Andrea Conti**



Any Other Business?

Thank you!

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