



**Technical Committee on
Transmission, Access, and Optical Systems (TAOS)
Meeting Minutes**

Authors: Walter Cerroni, Mauro Biagi, and Murat Yuksel
Date/Time: Tuesday, June 11, 2024 (7:30-9am MST)
Meeting Location: During ICC 2024 – Denver, CO, USA and online meeting
Officers: Walter Cerroni, Chair, walter.cerroni@unibo.it
Mauro Biagi, Vice Chair, mauro.biagi@uniroma1.it
Murat Yuksel, Secretary, murat.yuksel@ucf.edu

Meeting agenda:

1. Welcome and Introductions
2. Approval of the ICC 2024 Meeting Agenda
3. Approval of the Globecom 2023 Meeting Minutes (available online)
4. Conferences and Activities Update
5. TAOS TC Recertification Outcome
6. Update on TC Restructuring Process
7. Upcoming Elections of TAOS TC Secretary
8. TC Campaign Video Project
9. TAOS TC 2023 Awards
10. Short Presentations by Award Recipients
11. Any Other Business
12. Adjourn

The meeting was called to order at 7:30am.

Participants (25)

- Chedlia Ben Naila, Nagoya University, Japan
- Chia-Han Lee, National Yang Ming Chiao Tung University, Taiwan
- Dajana Cassioli, University of L'Aquila, Italy
- Daniel So, University of Manchester, United Kingdom
- David Larrabeiti, Universidad Carlos III de Madrid, Spain
- Eirini Eleni Tsiropoulou, University of New Mexico, United States

- Emad Alsusa, University of Manchester, United Kingdom
- Federico Tonini, CNIT, Italy
- Fei Guo, Xidian University, Shaanxi, Xi'an, China
- Hussein Mouftah, University of Ottawa, Ottawa, Canada
- Imran Shafique Ansari, University of Glasgow, United Kingdom
- Lutz Lampe, University of British Columbia, Canada
- Mauro, Biagi, University of Rome, "La Sapienza", Italy
- Mohamed Selim, Iowa State University, United States
- Muneeb Ul Hassan, Deakin University, Australia
- Murat Yuksel, University of Central Florida, United States
- Nikita Shanin, FAU Erlangen-Nürnberg, Germany
- Nitin Gupta, National Institute of Technology Hamirpur, India
- Roberto Rojas-Cessa, New Jersey Institute of Technology, United States
- Taisir Elgorashi, King's College London, United Kingdom
- Tarek El-Bawab, IEEE Communications Society, United States
- Umair Ahmed Korai Baloch, Mehran University of Engineering and Technology, Jamshoro, Pakistan
- Vasilis Papanikolaou, Friedrich-Alexander-University Erlangen-Nurember, Germany
- Walter Cerroni, University of Bologna, Italy
- Zuqing Zhu, University of Science and Technology, China

1. **Welcome and Introductions**

The meeting was held in-person as well as online. The Chair, Walter Cerroni, welcomed all participants and participants introduced themselves. The Chair presented the meeting agenda. The attached slides were presented by the Chair and discussed item-by-item throughout the meeting.

2. **Approval of the ICC 2024 Meeting Agenda**

A motion was made by Lutz Lampe to approve the agenda. The motion was seconded by Roberto Rojas-Cessas and the agenda was approved unanimously without further remarks.

3. **Approval of the Globecom 2023 Meeting Minutes (available online)**

A motion was made by Murat Yuksel to approve the minutes of the previous meeting held online around GLOBECOM 2023. The draft of the minutes was previously made available on the TAOS website (<http://taos.committees.comsoc.org/meetings>) and distributed to the TAOS members through the mailing list. The motion was seconded by Lutz Lampe and the minutes were approved unanimously without further remarks.

4. Conferences and Activities Update

A continued commitment of TAOS for the Optical Networks and Systems (ONS) and the Green Communication Systems and Networks (GCSN) symposia at ICC and GLOBECOM was affirmed. In coordination with other TCs, TAOS nominates chairs for these two symposia. The Chair reported the recent nominees for the two symposia and solicited interests and nominations for the upcoming symposia. The chair nominee for GLOBECOM GCSN 2025 was not approved but the chair nominee for GLOBECOM ONS 2025 was approved, and the chair nominees for ICC 2026 are submitted. The Chair explained that the reasons for disapprovals were inexperience in running symposia for ICC or GLOBECOM. Hence, for ICC 2026 nominations, backup nominations from experienced TAOS members or officers are submitted.

An analysis of the number of submissions, accepted papers and best paper award winners and nominees at ONS and GCSN was presented by some of the symposia chairs.

The Chair announced the International Conference on Optical Network Design and Modeling (ONDM) 2024 and reported that it is endorsed by TAOS. David Larraneiti-Lopez, the chair of ONDM'24, reported statistics about the conference.

The Chair announced selection of two TAOS members for IEEE journal editorial boards.

The Chair reminded that TAOS is open to endorsing other events and encouraged the audience to consider seeking TAOS endorsement for related events.

5. TAOS TC Recertification Outcome

The Chair announced that TAOS TC was recertified by the ComSoc TC Recertification Committee. The only comment was to increase the amount of participation in TAOS.

6. Update on TC Restructuring Process

The Chair gave a summary of the ComSoc TC restructuring process which has been taking places for the last few years. 12 TCs are planned, based on ICC/GLOBECOM symposia. The migration from the current TCs to these new TCs will be detailed and finalized by the end of 2025.

7. Upcoming Elections of TAOS TC Secretary

The Chair explained that the terms of the current officers will end by the end of 2024 and that a new Secretary must be elected while the current Vice Chair and Secretary moves to upper-level officer positions. The Chair announced that the TAOS Secretary election will be performed at the next TAOS meeting and solicited nominations and interests.

8. TC Campaign Video Project

The Chair reported that TAOS' 1-minute introductory and advertisement video is complete and posted at the TAOS website.

9. TAOS TC 2023 Awards

Mauro Biagi announced the winners of the TAOS TC Best Paper Awards for 2023. TAOS selects one best paper each from the ONS and GCSN symposia. The winners are:

- N. Shanin, H. Ajam, V. K. Papanikolaou, B. Schmauss, L. Cottatellucci and R. Schober, "EH Modelling and Achievable Rate for FSO SWIPT Systems with Non-Linear Photovoltaic Receivers," IEEE GLOBECOM ONS, Kuala Lumpur, Malaysia, 2023, pp. 5561-5567.
- M. Liu, F. Guo, Y. Chen and N. Zhao, "Blind Modulation Classification for OFDM in the Presence of Carrier Frequency Offsets," IEEE ICC GCSN, Rome, Italy, 2023, pp. 4683-4688.

10. Short Presentations by Award Recipients

The authors of the TAOS Best Paper Award winners made a short presentation of their papers.

11. Any Other Business

The Chair reminded the ongoing election of ComSoc President and Members-at-Large for the Board of Governors.

No other matters were raised by the meeting attendees.

12. Adjourn

Mauro Biagi moved to adjourn the meeting and Murat Yuksel seconded. The motion carried unanimously, and the meeting adjourned at 8:50am.

Attachments: Meeting Slides

A background graphic of a network diagram with white nodes and lines on a dark blue background, transitioning to a lighter blue on the left side.

Transmission, Access and Optical Systems (TAOS) TC

TC Meeting at ICC 2024

June 11, 2024

Walter Cerroni – TAOS TC Chair 2023-2024

Transmission, Access and Optical Systems (TAOS) TC

TC Meeting at ICC 2024

June 11, 2024

Walter Cerroni – TAOS TC Chair 2023-2024

**Please scan this QR code to register
your attendance at this meeting**



Attendance and TC Mailing List



- Please register your attendance at this meeting
 - Link to attendance form will be pasted periodically in the chat during the meeting
- If you are interested in getting involved in TAOS TC activities, please subscribe to the mailing list (if you have not done so already)
 - <https://taos.committees.comsoc.org/contact-us/>
 - or give your consensus in the attendance form

Welcome and Introductions

TAOS TC Officers for the 2023-2024 Term

**Chair**

Walter Cerroni
Department of Electrical, Electronic and Information Engineering "G. Marconi"
University of Bologna
via Venezia, 52
47521 Cesena (FC) - Italy
Tel. +39 0547-339209
e-mail: wcerroni@ieee.org

**Vice Chair**

Mauro Biagi
Department of Information Engineering, Electronics and Telecommunications
University of Rome "Sapienza"
Via Eudossiana, 18
00184 Rome - Italy
Tel. +39 06-44585856
e-mail: mauro.biagi@uniroma1.it

**Secretary**

Murat Yuksel
Department of Electrical and Computer Engineering
University of Central Florida
4328 Scorpius Street,
Orlando, FL 32816-2362, USA
Tel. +1 407-8234181
e-mail: murat.yuksel@ucf.edu

**Standards Liaison**

Jaafar Elmirghani
Department of Engineering
King's College London
Strand, London, WC2R 2LS, United Kingdom
e-mail: Jaafar.Elmirghani@kcl.ac.uk

Agenda (amended)

1. Welcome and Introductions
2. Approval of the ICC 2024 Meeting Agenda
3. Approval of the Globecom 2023 Meeting Minutes (available online)
4. Conferences and Activities Update
5. TAOS TC Recertification Outcome
6. Update on TC Restructuring Process
- 7. Upcoming Elections of TAOS TC Secretary**
8. TC Campaign Video Project
9. TAOS TC 2023 Awards
10. Short Presentations by Award Recipients
11. Any Other Business
12. Adjourn

Approval of the Globecom 2023 Meeting Minutes

- Available on the TAOS TC website
 - <https://taos.committees.comsoc.org/meetings/>



**Technical Committee on
Transmission, Access, and Optical Systems (TAOS)
Meeting Minutes (Draft)**

Authors: Walter Cerroni, Mauro Biagi, and Murat Yuksel
Date/Time: Tuesday, November 21, 2023 (7:30-9am EST)
Meeting Location: Before GLOBECOM 2023 – Online meeting
Officers: Walter Cerroni, Chair, walter.cerroni@uniibo.it
Mauro Biagi, Vice Chair, Mauro.biagi@uniroma1.it
Murat Yuksel, Secretary, murat.yuksel@ucf.edu

Meeting agenda:

1. Welcome and Introductions
2. Approval of the GLOBECOM 2023 Meeting Agenda
3. Approval of the ICC 2023 Meeting Minutes (available online)
4. Conferences and Activities Update
5. Updates on the TAOS TC Awards Subcommittee
6. TAOS TC Recertification
7. TC Campaign Video Project
8. Discussion on TAOS Nomination and Election Subcommittee
9. Any Other Business
10. Adjourn

The meeting was called to order at 7:30am.

Conferences and Activities update

Sponsored ICC/Globecom Symposia

- TAOS TC has consistently sponsored two symposia:
 - Symposium on Green Communications Systems and Networks (GCSN)
 - Symposium on Optical Networks and Systems (ONS)
- Our TC always seeks to coordinate with Symposium TPC Co-Chairs
 - Track hot and emerging topics relevant to GCSN and ONS
 - Help writing the CfP
 - Help finding TPC members
 - Stimulate new ideas

Conferences and Activities update

Sponsored ICC/Globecom Symposia – Chairs nominated by TAOS

- IEEE Globecom 2023 (Kuala Lumpur, Malaysia, 4–8 December 2023)
 - GCSN: Emad Alsusa (U. Manchester, UK)
 - ONS: Nicola Andriolli (National Research Council (CNR), Italy)
- IEEE ICC 2024 (Denver, CO, USA, 9–13 June 2024)
 - GCSN: Hamed Ahmadi (U. York, UK)
 - ONS: Lutz Lampe (U. British Columbia, Canada)
- IEEE Globecom 2024 (Cape Town, South Africa)
 - No nominations sent

Conferences and Activities update

Sponsored ICC/Globecom Symposia – Chairs nominated by TAOS

- IEEE ICC 2025 (Montreal, Canada)
 - GCSN: Daniel K. C. So (U. Manchester, UK)
- IEEE Globecom 2025 (Taipei, Taiwan)
 - GCSN: Antonio Cianfrani (U. Rome “La Sapienza”, Italy) --> **not approved**
 - ONS: Ali Khalighi (Fresnel Institute, France) --> **approved**
- IEEE ICC 2026 (Glasgow, UK) - nominated on May 30, 2024
 - GCSN: Antonio Cianfrani (U. Molise, Italy) + Walter Cerroni (U. Bologna, Italy)
 - ONS: Chedlia Ben Naila (Nagoya University, Japan) + Mauro Biagi (U. Rome “La Sapienza”, Italy)

Conferences and Activities update

Sponsored ICC/Globecom Symposia – Report

- IEEE Globecom 2023 (Kuala Lumpur, Malaysia, 4–8 December 2023)
- GCSN: Emad Alsusa (U. Manchester, UK)
 - 102 submitted papers
 - 42 accepted papers (41%)
 - 6 oral sessions (30 papers):
 - Green Federated Learning, Energy Harvesting Wireless Networks, Green UAV Networks, Advanced Green Networks, Battery-free Communications, Learning for Energy Efficiency
 - 3 interactive sessions (12 papers)
 - 2 papers nominated for Globecom 2023 BPA
 - 1 paper won one of the Globecom 2023 BPAs:
 - *Waste Factor: A New Metric for Evaluating Power Efficiency in any Cascade*
Mingjun Ying, Dipankar Shakya, Hitesh Poddar, Theodore S. Rappaport
- ONS: Nicola Andriolli (CNR, Italy)
 - 61 submitted papers (24 Networks, 37 Systems)
 - 24 accepted papers (39%) (9 Net., 15 Sys.)
 - 3 oral sessions (15 papers):
 - Optical Network Design and Recovery; Underwater and Visible Light Communications; Optical Wireless Communications
 - 3 interactive sessions (9 papers)
 - 2 papers nominated for Globecom 2023 BPA
 - 1 paper won one of the Globecom 2023 BPAs:
 - *Efficient Routing Method for Reducing Significant Outages in Optical Networks*
Katsuaki Higashimori, Takafumi Tanaka, Takeru Inoue

Conferences and Activities update

Sponsored ICC/Globecom Symposia – Report

- IEEE ICC 2024 (Denver, CO, USA, 9–13 June 2024)
- GCSN: Hamed Ahmadi (U. York, UK)
 - 84 papers submitted
 - 36 papers accepted (43%)
 - 6 oral sessions:
 - Federated Learning for Green Comm., Security and Privacy in Green Comm., RIS for Green Comm., Signal Processing for Green Comm., AI for Green Networks, Performance Optimization for Green Networks
 - 1 interactive session
 - 1 paper won one of the ICC 2024 BPAs:
 - *Power-Managed Data Centers for Sustainable Computing*
Emi Zeger, Nicholas Bambos, and Mert Pilanci
- ONS: Lutz Lampe (U. British Columbia, Canada)
 - 53 papers submitted (1 reviewed separately)
 - 21 papers accepted (39%)
 - 4 oral sessions:
 - LiFi and FSO Communication Systems; Core Networks; Signal Processing for Visible Light Communication; Quantum, Metro, and Access
 - 1 interactive session
 - 3 papers nominated for ICC 2024 BPA
 - 1 paper won one of the ICC 2024 BPAs:
 - *Secret Key Generation in Multi-Mode Fiber Channels: Channel Measurements and Achievable Rates*
Pin-Hsun Lin et al.

Conferences and Activities update

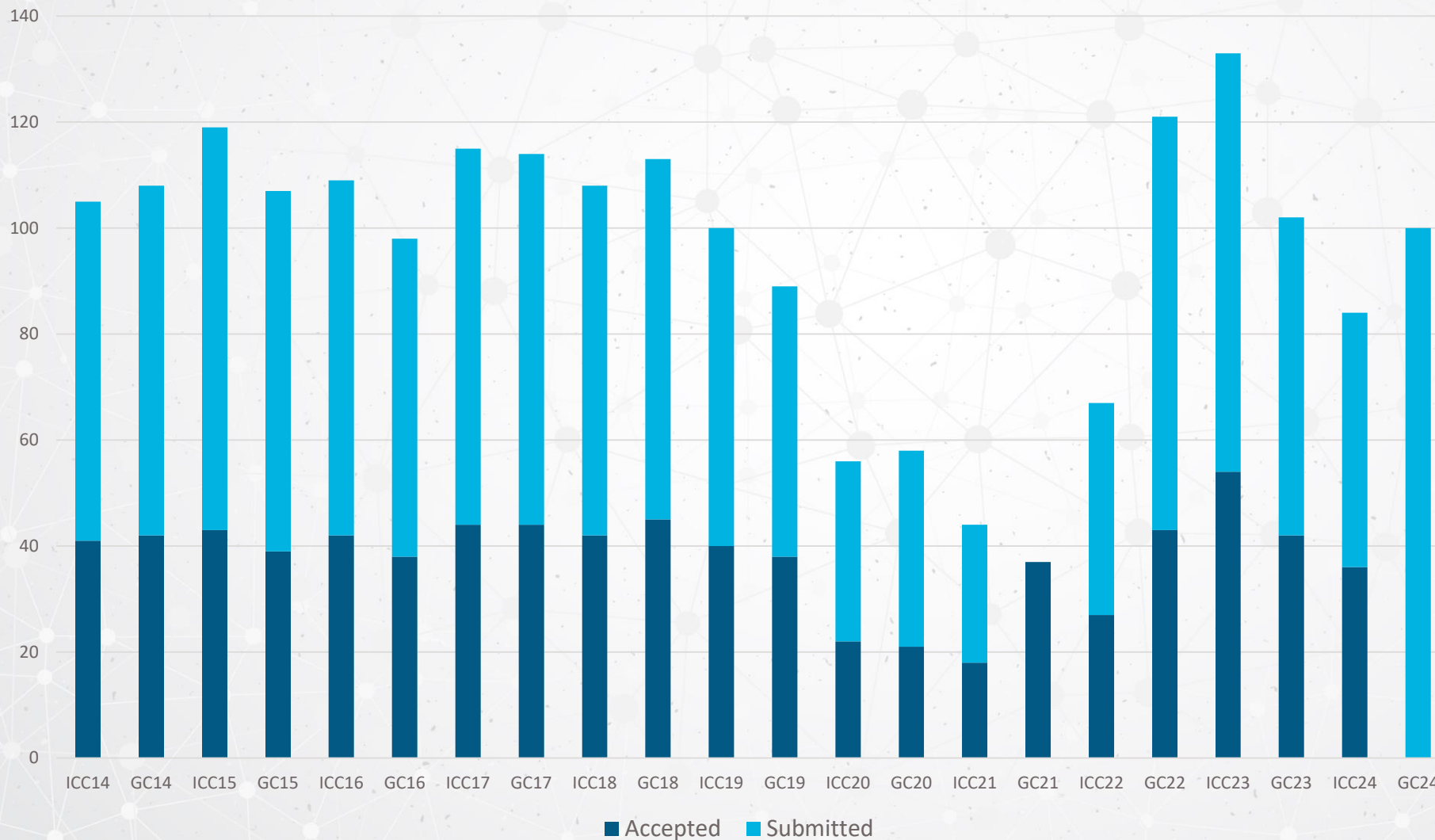
Sponsored ICC/Globecom Symposia – Report

- IEEE Globecom 2024 (Cape Town, South Africa, 8–12 December 2024)
- Paper submission deadline expired on **April 30th, 2024**
- Acceptance notification planned for **August 1st, 2024**

- GCSN: Yuan Wu (not nominated by TAOS)
(U. Macau, Macau, China)
 - 100 papers submitted
- ONS: Anny Zheng (not nominated by TAOS)
(Google LLC, USA)
 - 63 papers submitted

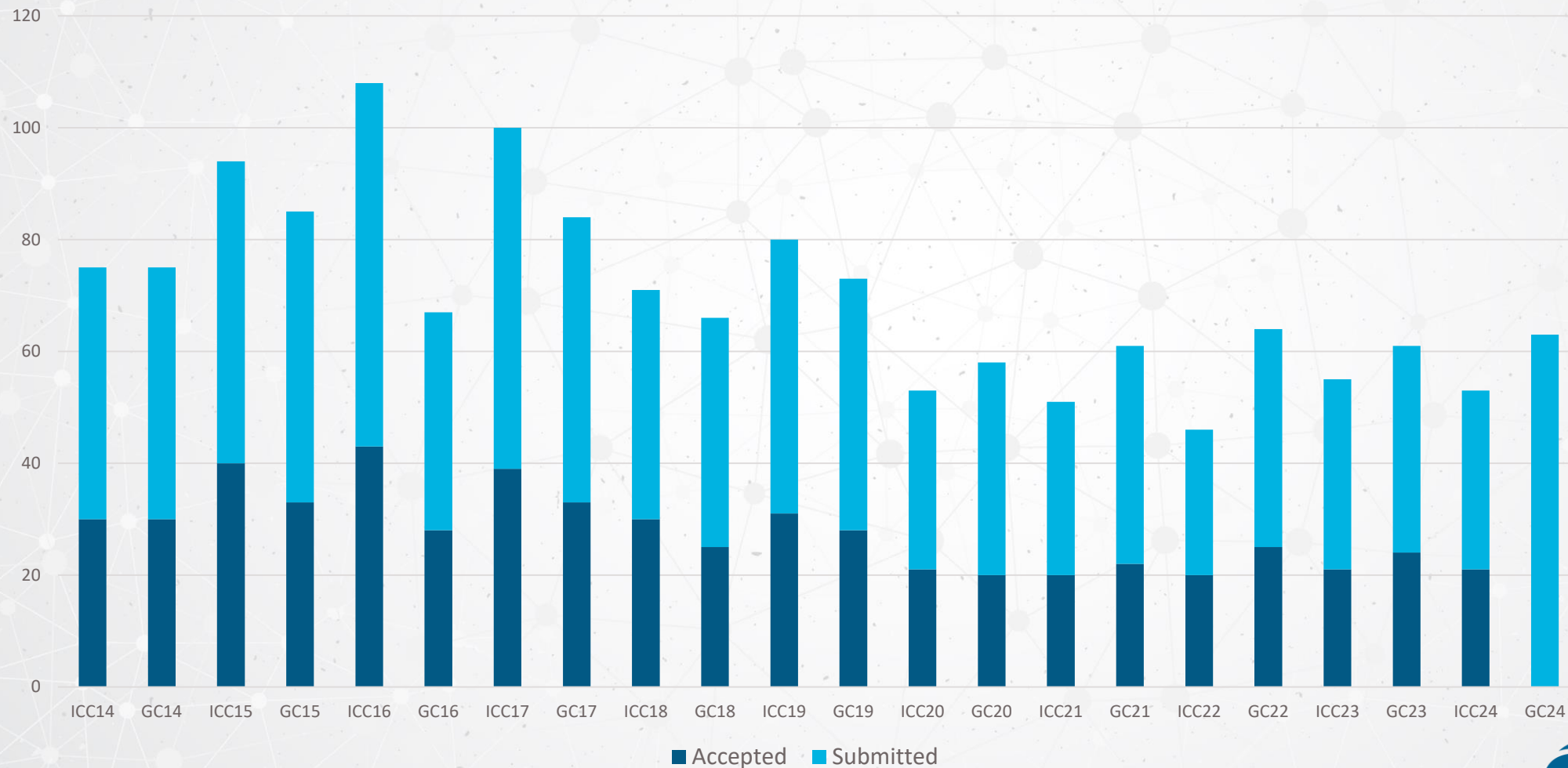
Conferences and Activities update

Sponsored ICC/Globecom Symposia – GCSN Statistics



Conferences and Activities update

Sponsored ICC/Globecom Symposia – ONS Statistics



Conferences and Activities update

Other Events Endorsed by TAOS TC

- 28th International Conference on Optical Network Design and Modelling (ONDM 2024)
 - 6–9 May 2024, Madrid, Spain <https://ondm2024.uc3m.es/>
 - General Chair: David Larrabeiti-López, University Carlos III de Madrid (UC3M), Madrid, Spain
 - TPC Co-Chairs:
 - Luca Valcarengi, Scuola Superiore Sant'Anna, Pisa, Italy
 - Carmen Mas-Machuca, University of the Bundeswehr Munich (UniBW), Munich, Germany
 - José A. Hernández-Gutiérrez, University Carlos III de Madrid (UC3M), Madrid, Spain
 - 73 submitted papers, 36 accepted (49.32% acceptance) - similar figures as ONDM 2023
 - 36 technical papers + 6 invited papers + 6 invited talks + 16 posters + 4 keynotes + 3 tutorials
 - 6 co-located workshops
 - 129 attendees from 22 countries

Conferences and Activities update

Other Events

- TAOS TC technically endorses other events
 - Either co-located w/ ICC and Globecom, or stand-alone
 - Support for IEEE ComSoc Technical Co-sponsorship
- For event endorsement requests, please contact the TAOS officers
 - <https://taos.committees.comsoc.org/activities/endorsement/>

Conferences and Activities update

IEEE Journal and Magazine Editorial Boards

- New Editorial Board Memberships
 - Mauro Biagi and Murat Yuksel, Associate Editors, IEEE Transactions on Communications

TAOS TC Recertification Outcome

- Each TC must go through a periodic review process and obtain the required recertification from ComSoc
- Previous TAOS TC recertification was in November 2020
- We had to fill in a recertification questionnaire for the period 2021-2023
- Questionnaire submitted on September 15, 2023
 - Demographics, Relevant activities, Achievements / challenges, New areas
- Outcome: TAOS TC has been **successfully recertified** by the ComSoc TC Recertification Committee (Nov. 29, 2023)
 - Recommended improvement: increase membership and the attendance of the TC meetings
- **Thank you to all TAOS TC Active Members!**

Update on TC Restructuring Process

Reorganization of ComSoc TCs in 2022-2023

Ad Hoc Committee Chair: Wei Zhang

Voting Members: Ana García Armada | Jeff Andrews | Vincent Chan | Nelson Fonseca | Stefano Galli | Wendi Heinzelman | Khaled Ben Letaief | Shiwen Mao | Zhisheng Niu | Sumei Sun | Chengshan Xiao

Restructure Subcommittee

Chair: Shiwen Mao

Members: Cheng Li | Burak Kantarci | Periklis Chatzimisios | Xiaojun Cao | Linda Jiang Xie | Angela Yingjun Zhang | Zhisheng Niu

Staff: Cyn Sikora, Harold Tepper

- ▶ Identify the key problems of TCs and come up with an initial structure
- ▶ Bring more interest from industry, encompass present and future areas of ComSoc, address the current problems of TC structure

FOG Subcommittee (Functions/Operations/Goals)

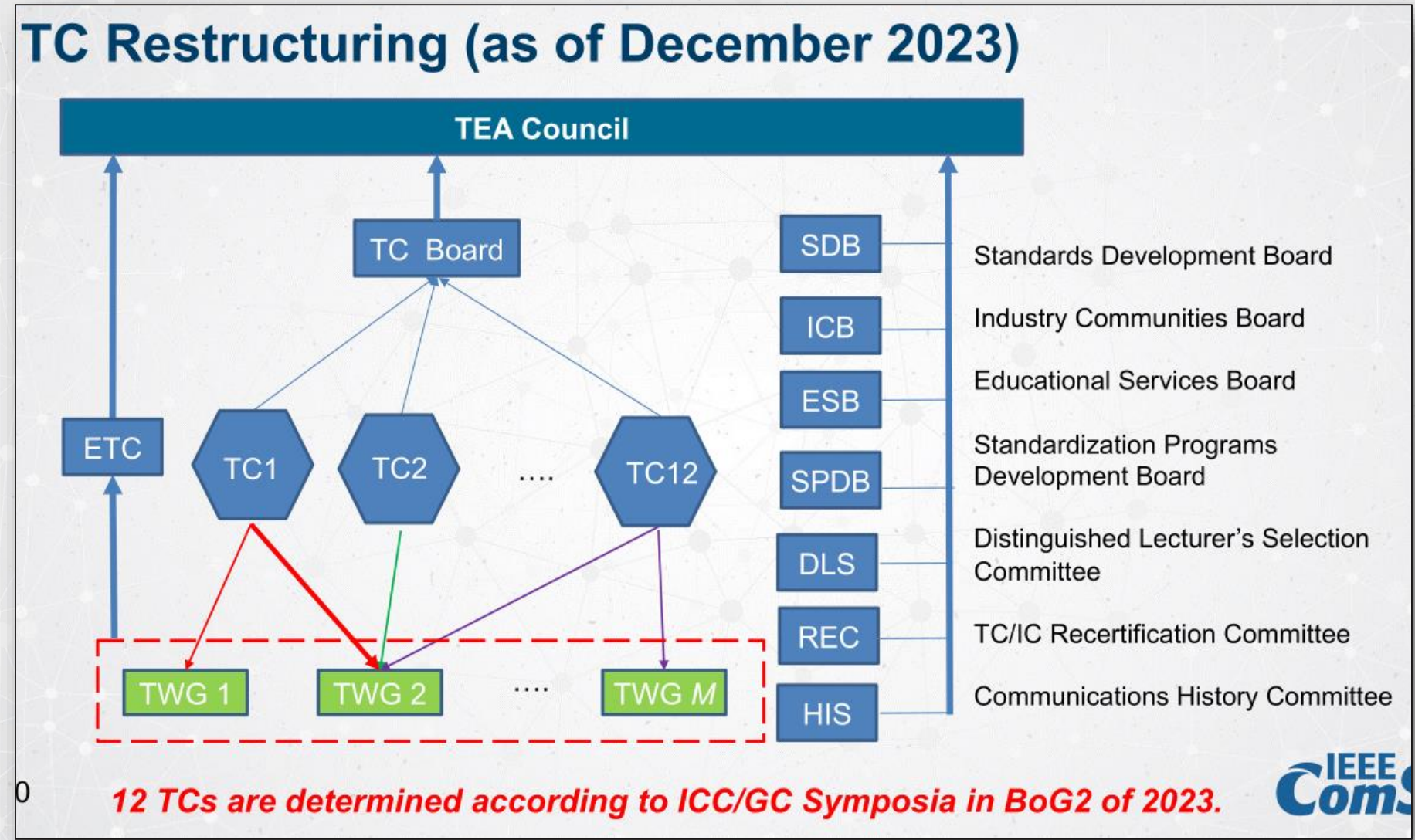
Chair: Zhisheng Niu

Members: Nirwan Ansari | Koichi Asatani | Lin Cai | Luis M. Correia | Ekram Hossain | Rose Qingyang Hu | Shiwen Mao | Heiner Stuetzgen

Staff: Cyn Sikora, Harold Tepper

- ▶ Develop a set of policies to manage and operate the new TC structure
- ▶ Clarify the functions/operations/goals (FOG) of the new TCs/TWGs
- ▶ Define performance measures/KPIs to accomplish new TC goals and to evaluate performance of TCs & TWGs
- ▶ Create process to incorporate new technology areas and define evolution

Update on TC Restructuring Process



Source: Slides of ComSoc TC Board Meeting, Feb. 12, 2024



Update on TC Restructuring Process

New TC

Elected TC Officers

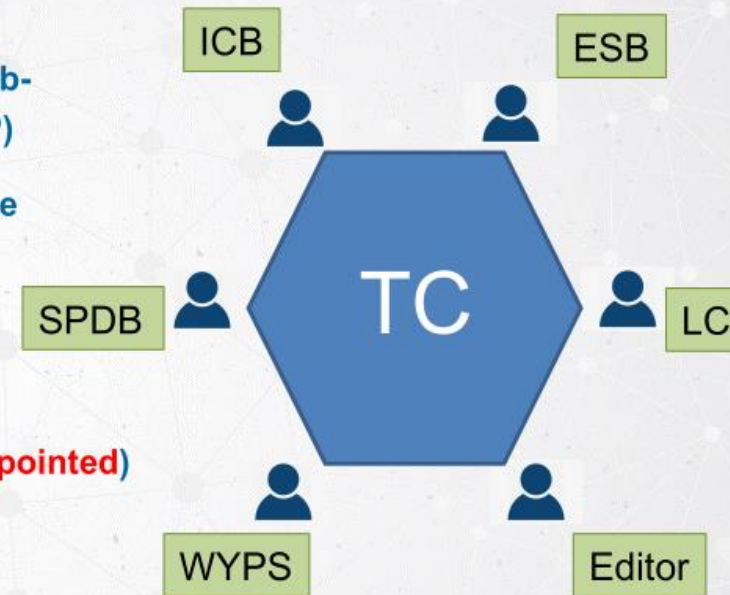
- Chair (elected)
- Vice Chairs (elected)
industry/academia
- Secretary (elected)

Appointed TC Officers (**NEW**, upon TC's own discretion)

- TC Standardization Programs Development Coordinator (**appointed**)
- TC Industry Communities Coordinator (**appointed**)
- TC Educational Services Coordinator (**appointed**)
- TC WICE/YP/Student Services Coordinator (**appointed**)
- TC Local Chapters Coordinator (**appointed**)
- TC Newsletter Editor (**appointed**)

TC Subcommittees

- TC Nomination & Election Sub-committee (see ComSoc P&P)
- TC Award Sub-committee (see ComSoc P&P)



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Update on TC Restructuring Process

TWG

TWG will replace ETI & SIG, and will be overseen by Emerging Technology Committee.

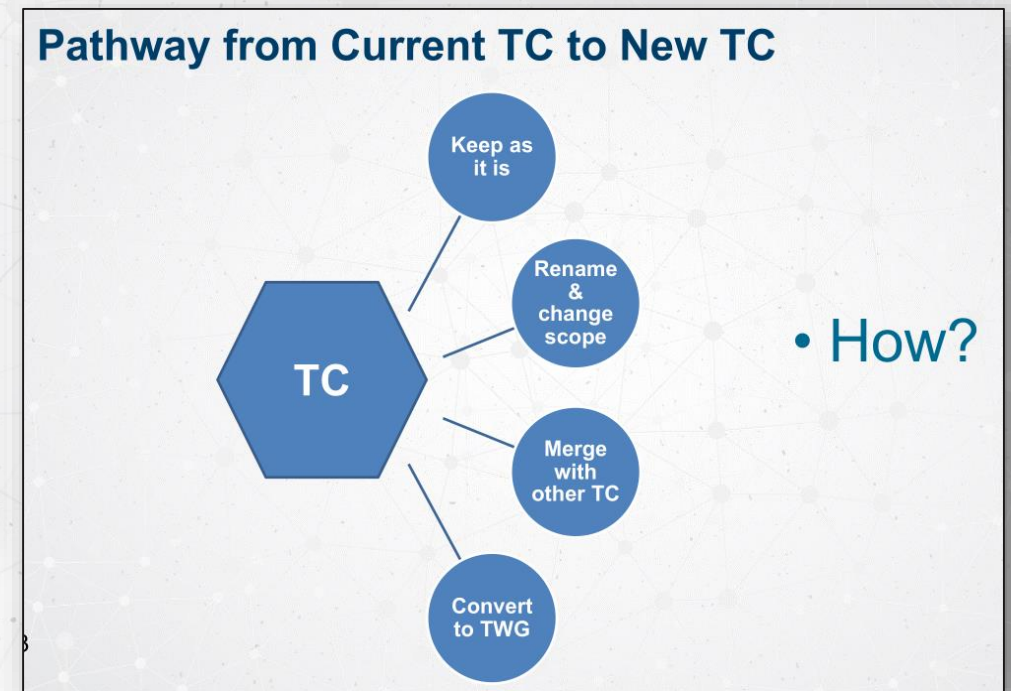
Key TWG Officers (Appointed by the managing TC chair)

- Chair
- Vice Chair(s)
- Secretary

Other TWG Officers/members

- Advisor(s) and/or advisory board
- Key members

TWG Awards



Update on TC Restructuring Process


TC Restructuring Timeline (2024-2025)

2024

- Establish Ad Hoc Committee
- Further Consultation with each TC, identify a pathway to fit in the new structure
- Revise TC related parts of the ComSoc P&Ps

2025

- Implement the TC new structure according to the revised ComSoc P&Ps
- Guide the current TCs to be migrated to new TC structure
- Finish the TC restructure by December 2025

 Next TC Board Meeting: July 1st, 2024

Upcoming Elections of TAOS TC Secretary

- The term for the current slate of officers will end on December 31, 2024
- Per TAOS Policies and Procedures (P&Ps):
 - On completion of the term, the TAOS Chair retires, the Vice-Chair steps up to the position of Chair, the Secretary steps up to Vice-Chair and a new Secretary is elected
 - TC officers (Chair, Vice-Chair, and Secretary) are elected for two-year terms
 - Candidates for these positions are ComSoc members nominated by the TAOS steering committee
- Call for expressions of interest will open soon - Stay tuned!
- Voting will be done electronically (most probably in October) and the results will be made public at the next online TAOS TC meeting (most probably in November)
- Voting is restricted to Active TAOS TC Members
 - Individuals that have attended (physically or virtually) **two or more of the prior five** regularly scheduled TC meetings

TC Campaign Video Project

- In 2023 the TEA Council launched a video campaign to promote the TC activities
- TAOS TC submitted a proposal for a short video
- The proposal was accepted and a budget of \$1,000 was granted
- We contacted IEEEtv for support
 - The budget allows for a 1-minute video with images and text descriptions
- TC promotional video was released on Jan. 2nd, 2024
- You can find it in the TAOS TC home page:
<https://taos.committees.comsoc.org/>

TAOS TC 2023 Awards

- Nominations received
 - Best symposium paper award, related to ICC/Globecom ONS symposia technically sponsored by TAOS TC in 2023: 6 nominations (3 from ICC 2023 ONS, 3 from GC 2023 ONS)
 - Best symposium paper award, related to ICC/Globecom GCSN symposia technically sponsored by TAOS TC in 2023: 4 nominations (3 from ICC 2023 GCSN, 1 from GC 2023 GCSN)
- Selection made by the TAOS Awards Subcommittee
 - Mauro Biagi (U. Rome "La Sapienza", Italy) - Subcommittee Chair
 - Abdelmoula Bekkali (CTTC, Spain)
 - Chedlia Ben Naila (Nagoya U., Japan)
 - Melike Erol-Kantarci (U. Ottawa, Canada)
 - Daniel K. C. So (U. Manchester, UK)

2023 IEEE TAOS TC Best ONS Paper Award

Presented at IEEE Globecom 2023 Optical Networks and Systems Symposium

EH Modelling and Achievable Rate for FSO SWIPT Systems with Non-linear Photovoltaic Receivers

- Authors: Nikita Shanin, Hedieh Ajam, Vasilis K. Papanikolaou, Bernhard Schmauss, Laura Cottatellucci, Robert Schober
- *The paper achieves an outstanding level in showing the non linearity properties in energy harvesting for simultaneous wireless information and power transfer (SWIPT) systems. It is expected that this work will have a big impact on scientific community in the future.*
- Link to the paper on IEEE Xplore: <https://ieeexplore.ieee.org/document/10437729>

2023 IEEE TAOS TC Best GCSN Paper Award

Presented at IEEE ICC 2023 Green Communications Systems and Networks Symposium

Blind Modulation Classification for OFDM in the Presence of Carrier Frequency Offsets

- Authors: Mingqian Liu, Fei Guo, Yunfei Chen, Nan Zhao
- *The proposed method has a solid and elegant mathematical framework and demonstrates to achieve very good performance and, at the same time, it reduces energy consumption and is beneficial for green radios.*
- Link to the paper on IEEE Xplore: <https://ieeexplore.ieee.org/document/10279377>

Short Presentations by Award Recipients

- Best 2023 ONS Paper

- **Nikita Shanin**

Department of Electrical Engineering
Institute for Digital Communications
Friedrich-Alexander-Universität Erlangen-
Nürnberg, Erlangen, Germany

- Best 2023 GCSN Paper

- **Mingqian Liu**

State Key Laboratory of Integrated Service
Networks
Xidian University
Xi'an, Shaanxi, China

Any Other Business

- 2024 IEEE ComSoc President and BoG Members-at-Large Election
Vote by 24 July 2024
- Please feel free to raise any questions on discussion points from this meeting or other topic/issues
- Feel free to follow up with any comments at any time via email to the TAOS TC Officers
 - wcerroni@ieee.org
 - mauro.biagi@uniroma1.it
 - murat.yuksel@ucf.edu

A network diagram consisting of numerous light blue nodes connected by thin lines, set against a dark blue background. The nodes are arranged in a somewhat circular pattern, with some nodes having multiple connections, creating a complex web of lines.

Adjourn

Thank you!



西安电子科技大学
XIDIAN UNIVERSITY



Blind Modulation Classification for OFDM in the Presence of Carrier Frequency Offsets

Authors: [Mingqian Liu](#), Fei Guo, Yunfei Chen, Nan Zhao

Presenter: Fei Guo

State Key Laboratory of Integrated Service Networks,
Xidian University, Xi' an, China



BACKGROUND&MOTIVATIONS

- Accurate modulation classification is essential in OFDM receivers, but Carrier frequency offset challenges modulation classification in OFDM.
- Existing problems:
 - High computational complexity
 - Neglect of multipath channel effects
 - Low robustness against noise
 - Neglect of the virtual and pilot subcarriers.
- ✓ the OFDM subcarrier's statistic with carrier frequency offset can be used for blind modulation classification



PROPOSED METHOD

Virtual and Pilot Subcarriers Classification

Second-order moment

$$M_{21}(\text{Virtual}) = E[|W_{n,k}|^2]$$

$$M_{21}(\text{Pilot}) = 4\sigma^2 + E[|W_{n,k}|^2]$$

$$M_{21}(\text{Data}) = 2\sigma^2 + E[|W_{n,k}|^2]$$

$$\eta_1 = \sigma^2 + E[|W_{n,k}|^2]$$

$$\eta_2 = 3\sigma^2 + E[|W_{n,k}|^2]$$

$$M_{21}(Y_{n,k}) \leq \eta_1, \text{ Virtual Subcarrier}$$

$$M_{21}(Y_{n,k}) \geq \eta_2, \text{ Pilot Subcarrier}$$

$$\textit{otherwise}, \text{ Data Subcarrier}$$



PROPOSED METHOD

Modulation Subcarriers Classification

Fourth-order moment

$$C_{42}(Y_{QPSK}) = 0$$

$$C_{42}(Y_{16QAM}) = 8\sigma^4(|\alpha_0|^4 + |\alpha_{-1}|^4 + |\alpha_1|^4) \times 0.32 \approx 2.56\sigma^4$$

$$C_{42}(Y_{64QAM}) = 8\sigma^4(|\alpha_0|^4 + |\alpha_{-1}|^4 + |\alpha_1|^4) \times 0.38 \approx 3.04\sigma^4$$

$$\frac{C_{63}^2(Y_{n,k})}{C_{42}^3(Y_{n,k})} = \frac{(|\alpha_0|^6 + |\alpha_{-1}|^6 + |\alpha_1|^6)^2}{(|\alpha_0|^4 + |\alpha_{-1}|^4 + |\alpha_1|^4)^3} \cdot \frac{9(E[|X|^6] - 3E[|X|^4]E[|X|^2] + 2E^3[|X|^2])^2}{2(E[|X|^4] - E^2[|X|^2])^3}$$

$$\left\{ \begin{array}{l} C_{42} \leq 1.28\sigma^4, \text{ QPSK} \\ \frac{C_{63}^2}{C_{42}^3} \leq 0.2789, \text{ 16QAM} \\ \frac{C_{63}^2}{C_{42}^3} \geq 0.2789, \text{ 64QAM} \end{array} \right.$$



SIMULATION RESULTS

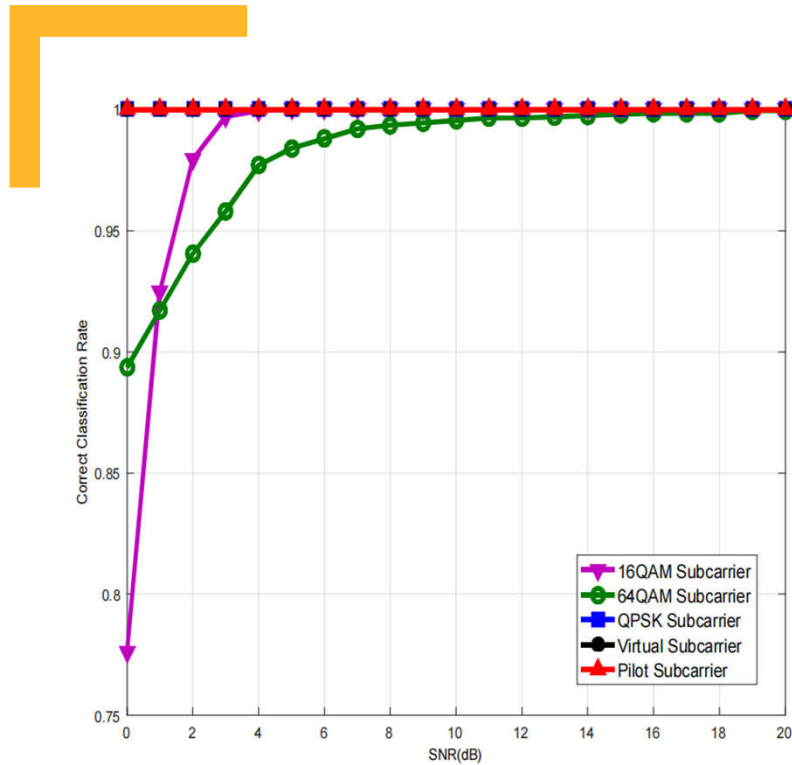


Fig. 1. Subcarrier classification performance with different SNRs

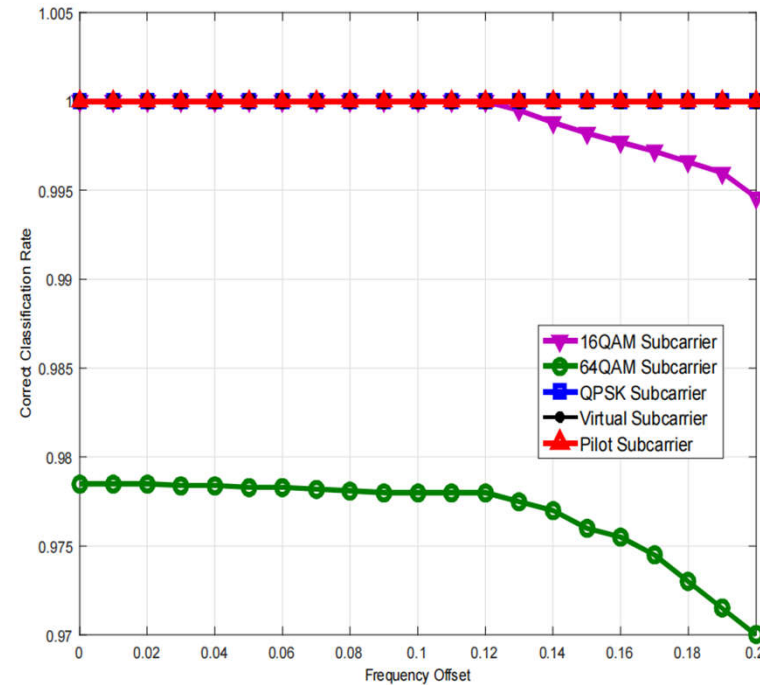


Fig. 2. Subcarrier classification performance with different CFOs



SIMULATION RESULTS

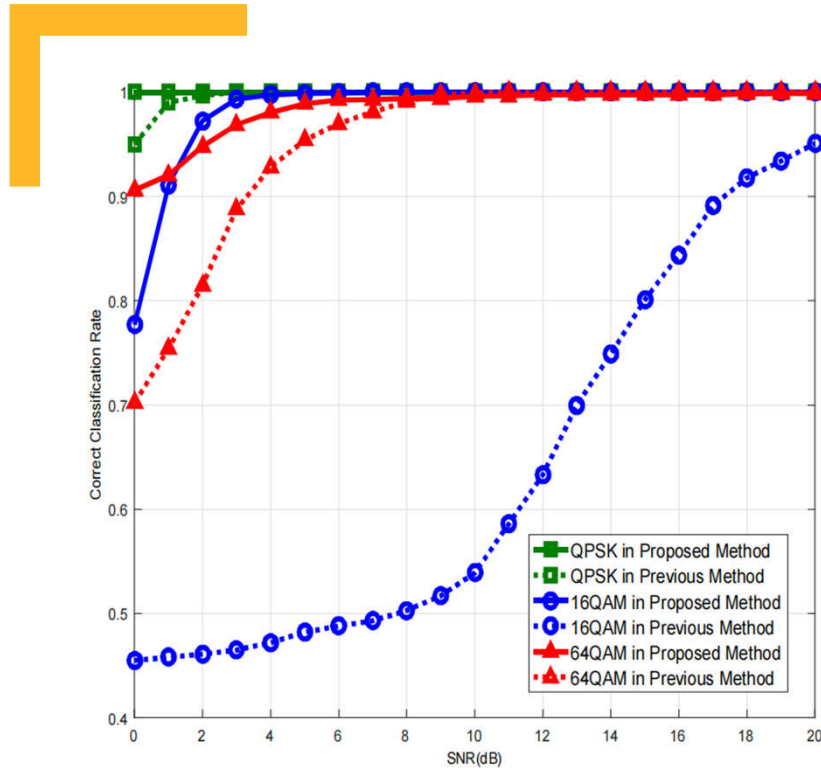


Fig. 3. Subcarrier classification performance comparison with QPSK, 16QAM and 64QAM

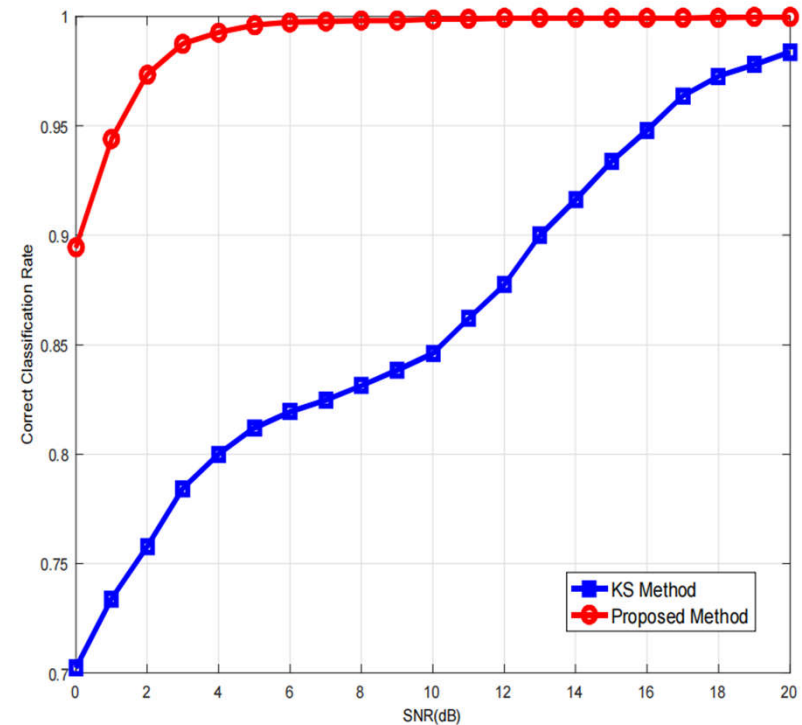


Fig. 4. Classification performance comparison with different methods



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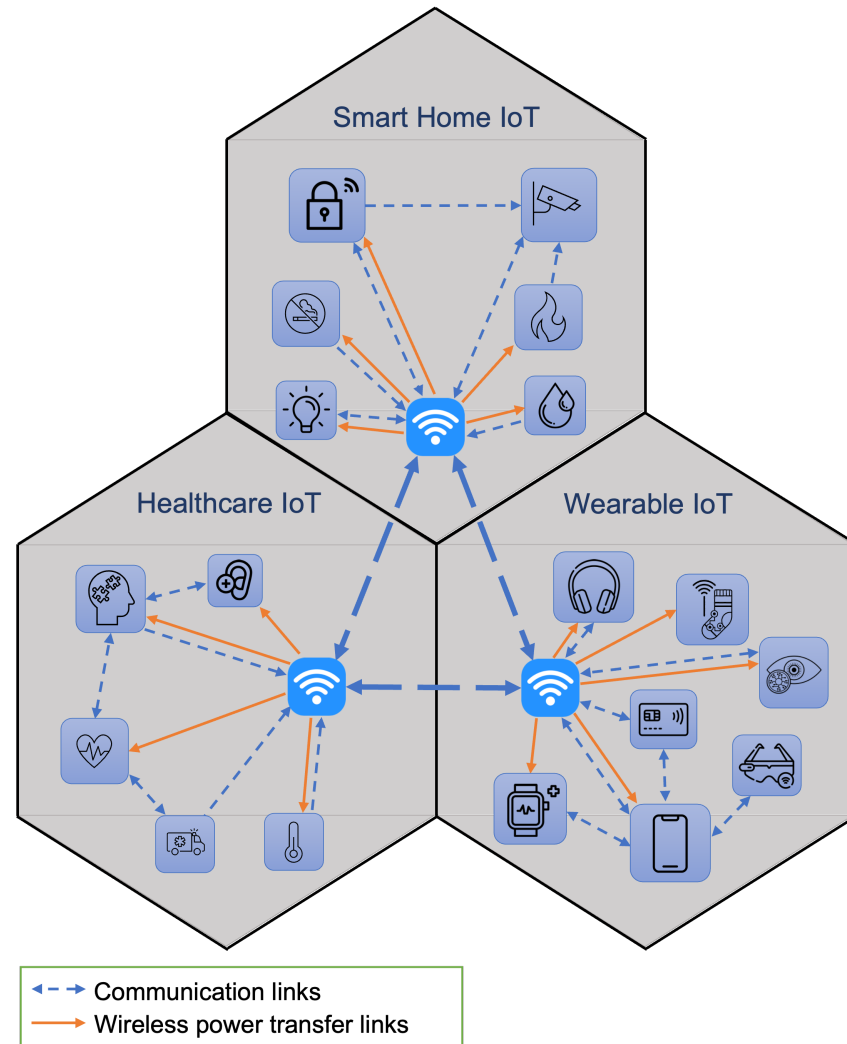
Thanks for watching

EH Modelling and Achievable Rate for FSO SWIPT Systems with Non-linear Photovoltaic Receivers

Dr.-Ing. Nikita Shanin, Hedieh Ajam, Dr. Vasilis K. Papanikolaou, Prof. Dr.-Ing. Bernhard Schmauss, Prof. Dr. Laura Cottatellucci, Prof. Dr.-Ing. Robert Schober

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IEEE ComSoc TAOS TC Meeting
June 11, 2024



Applications of IoT

- Wearable devices
- Smart homes
- Healthcare
- Environment monitoring

Challenges

- Small size of the devices
- Low power consumption
- Battery replacement

Solution

- Photovoltaic-based FSO SWIPT

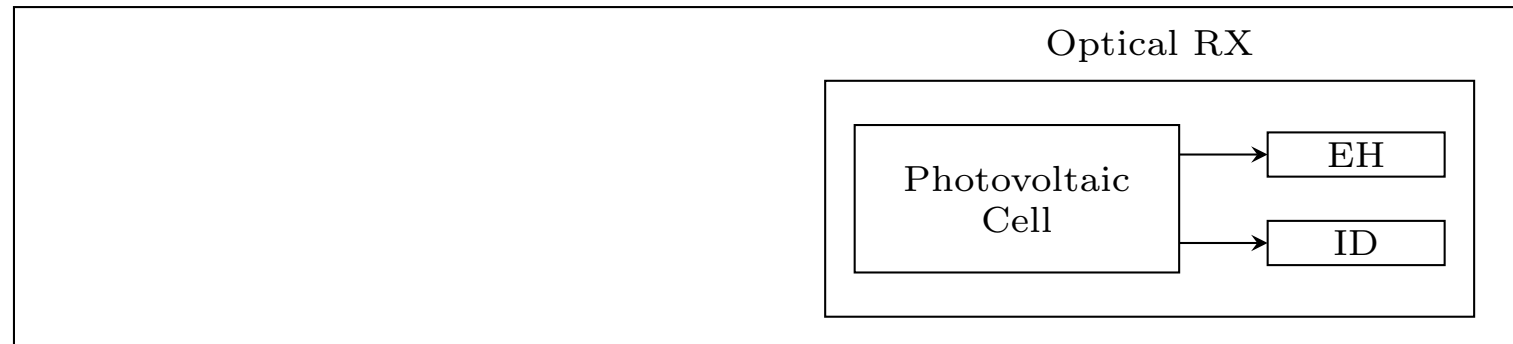


Figure: Considered FSO SWIPT system model

- A **single optical receiver** (RX) equipped with a **photovoltaic cell** for energy harvesting (EH) and information detection (ID)

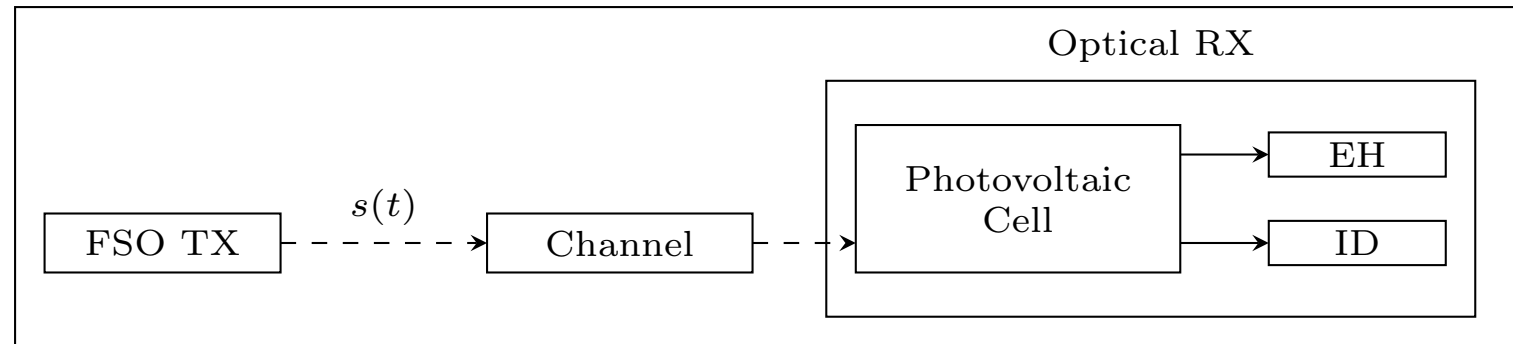


Figure: Considered FSO SWIPT system model

- A **single optical receiver** (RX) equipped with a **photovoltaic cell** for energy harvesting (EH) and information detection (ID)
- Transmit **FSO intensity-modulated signal** $s(t)$ at carrier wavelength λ_0 focused at the RX and FSO channel gain $h \in \mathbb{R}$

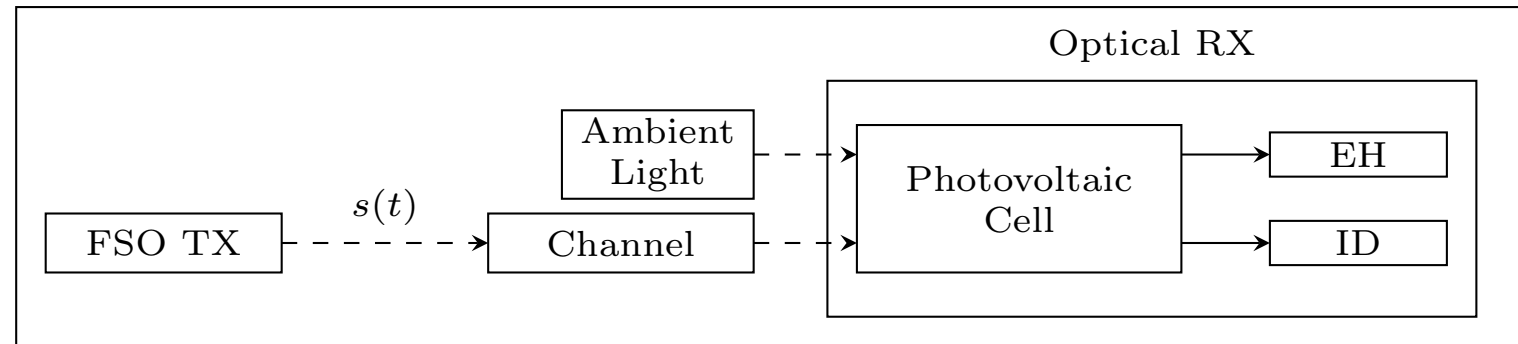


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- Transmit **FSO intensity-modulated signal** $s(t)$ at carrier wavelength λ_0 focused at the RX and FSO channel gain $h \in \mathbb{R}$
- **Ambient light** source (sun or indoor illumination) with power spectral density $\tilde{p}_a(\lambda)$

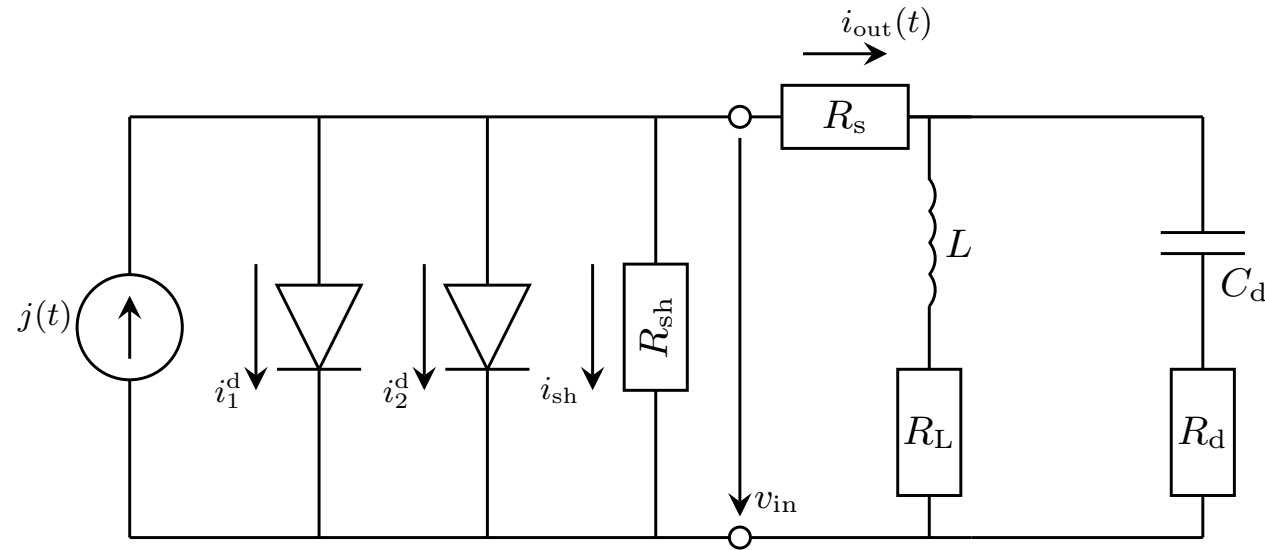


Figure: Equivalent electrical circuit of the RX

EH and ID at the RX

- **ID unit** (e.g., a microcontroller) is modelled by **resistance** R_d
- **EH load** (e.g., a battery) is modelled by **resistance** R_L

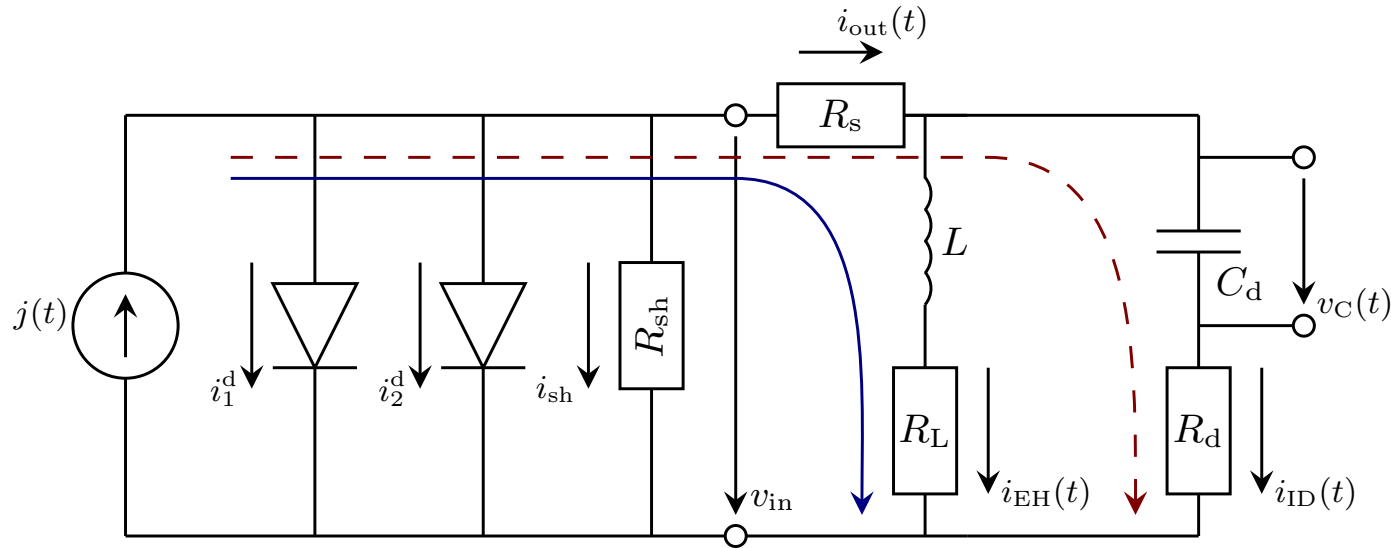


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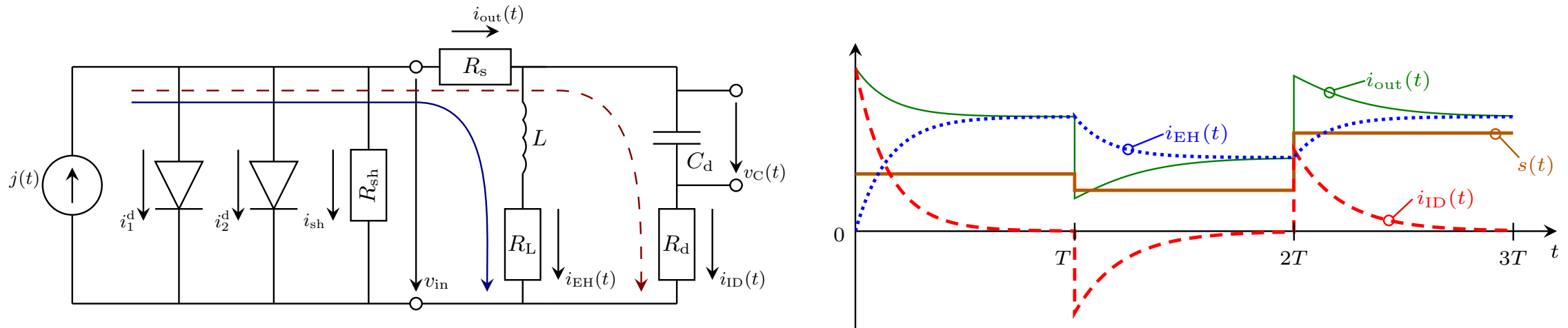


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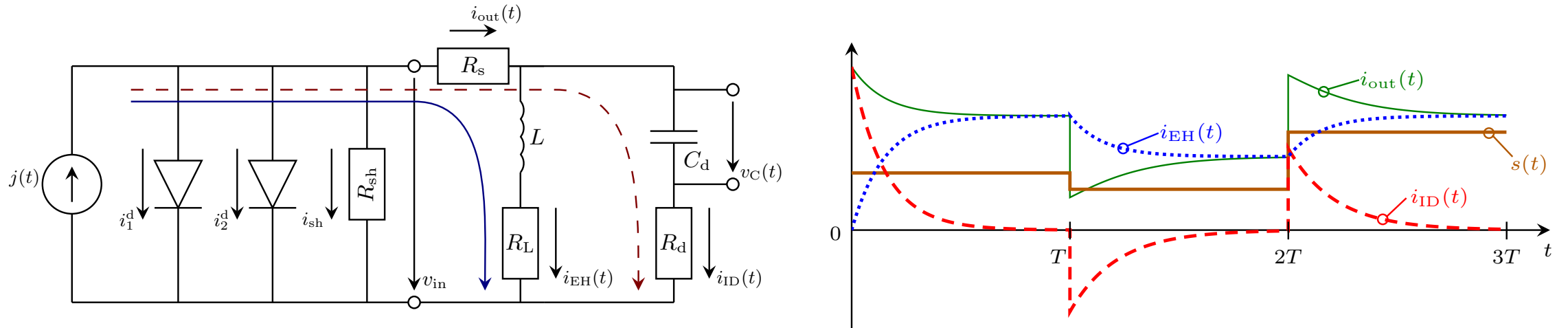


Figure: Equivalent electrical circuit of the RX

Harvested Power at the EH Load in time slot k

$$P_{\text{harv}}(s[k], p_a) = i_{\text{EH}}^2 R_L = R_L \left[h s[k] r(\lambda) + p_a + I_s - \frac{V_T}{R_\Sigma} W_0 \left(I_s \frac{R_\Sigma}{V_T} \exp \left[\frac{R_\Sigma}{V_T} (h s[k] r_0 + p_a + I_s) \right] \right) \right]^2 \quad (1)$$

- $p_a = \int_{\lambda} \tilde{p}_a(\lambda) r(\lambda) d\lambda$ is the equivalent current due to the **ambient light**
- $W_0(\cdot)$ is the Lambert-W function
- I_s , V_T , and R_Σ are the parameters of the diodes and RX circuit

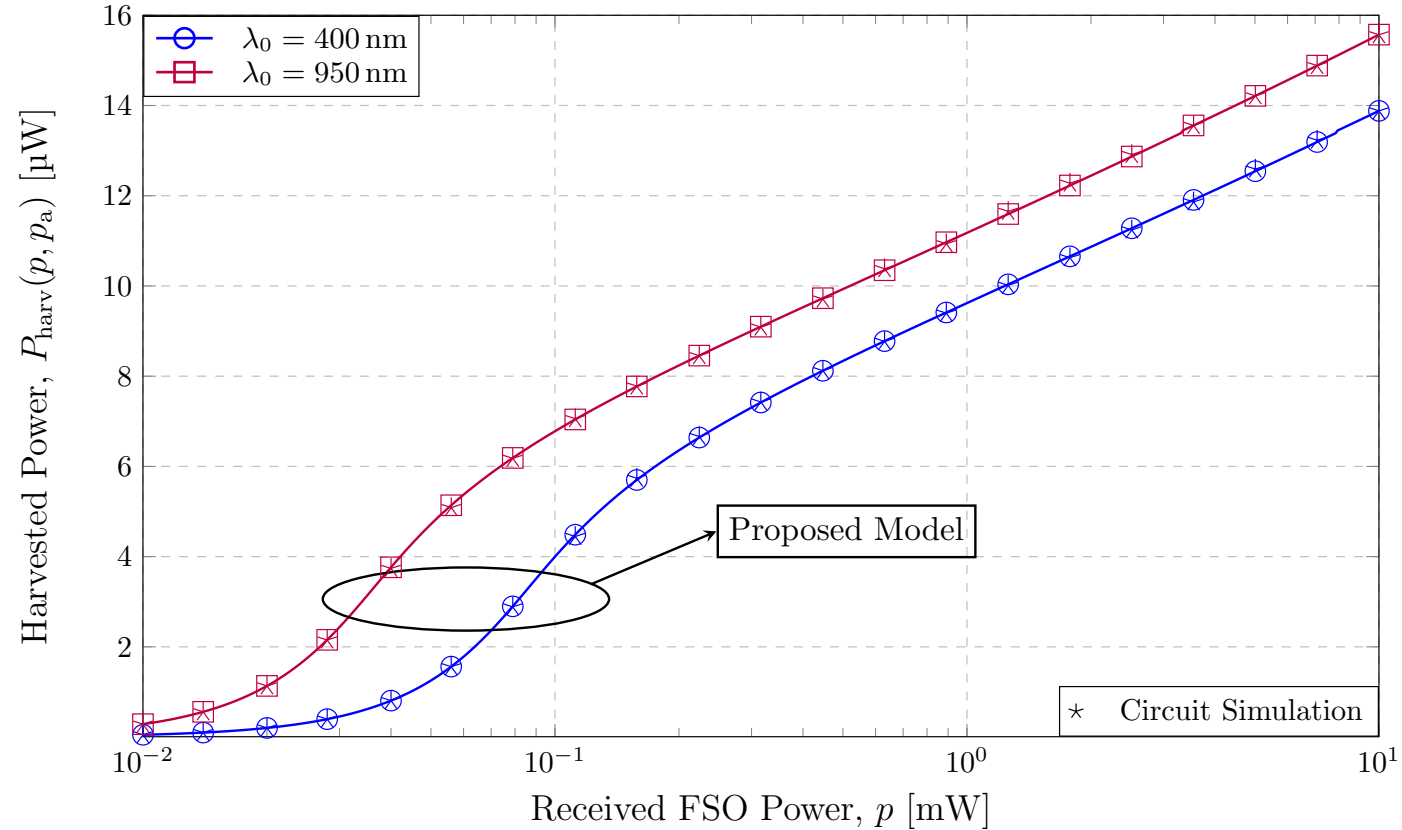


Figure: Validation of the derived EH model

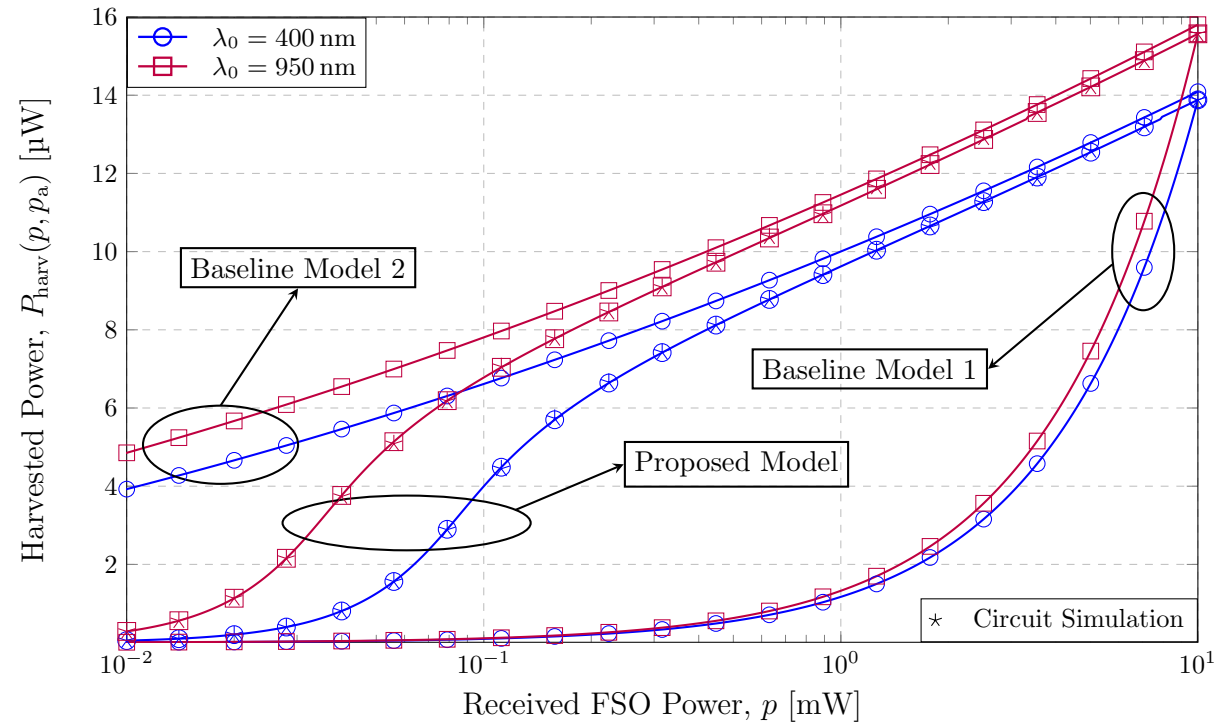


Figure: Validation of the derived EH model

Baseline EH Models

- Baseline Model 1: Maximum power point (MPP) tracking at the RX
- Baseline Model 2: Single-diode RX circuit

Low-complexity Filter Design and Achievable Information Rate

- We **integrate** the current through the ID unit over the duration of a time slot:

$$r[k] = \int_{(k-1)T}^{kT} R_d i_{ID}(t) dt = \int_{(k-1)T}^{kT} R_d C_d \frac{dv_C(t)}{dt} dt = (\tilde{x}[k] - \tilde{x}[k-1]) + (\tilde{n}[k] - \tilde{n}[k-1]) \quad (2)$$

- To **avoid** the undesired **memory** of the RX, we obtain the **normalized output signal** as

$$y[k] = \frac{1}{R_d C_d \sqrt{R_L}} \sum_{p=0}^k r[k] = x[k] + n[k] \quad (3)$$

- Information signal $x[k] = \sqrt{P_{\text{harv}}(s[k], p_a)}$
- Noise samples $n[k] = \frac{1}{R_d C_d \sqrt{R_L}} \tilde{n}[k]$ are modelled as i.i.d. realizations of AWGN with variance σ^2
- We determine the **maximum achievable rate** and the **optimal TX signal distribution** as follows:

$$\bar{R}(A^2) = \frac{1}{2} \ln \left(1 + \frac{[\sqrt{P_{\text{harv}}(A^2, p_a)} - \sqrt{P_{\text{harv}}(0, p_a)}]^2}{2\pi e \sigma^2} \right) \quad F_s^*(s) = \frac{\sqrt{P_{\text{harv}}(hs, p_a)} - \sqrt{P_{\text{harv}}(0, p_a)}}{\sqrt{P_{\text{harv}}(hA^2, p_a)} - \sqrt{P_{\text{harv}}(0, p_a)}}, \quad s \in [0, A^2].$$

Achievable Rates

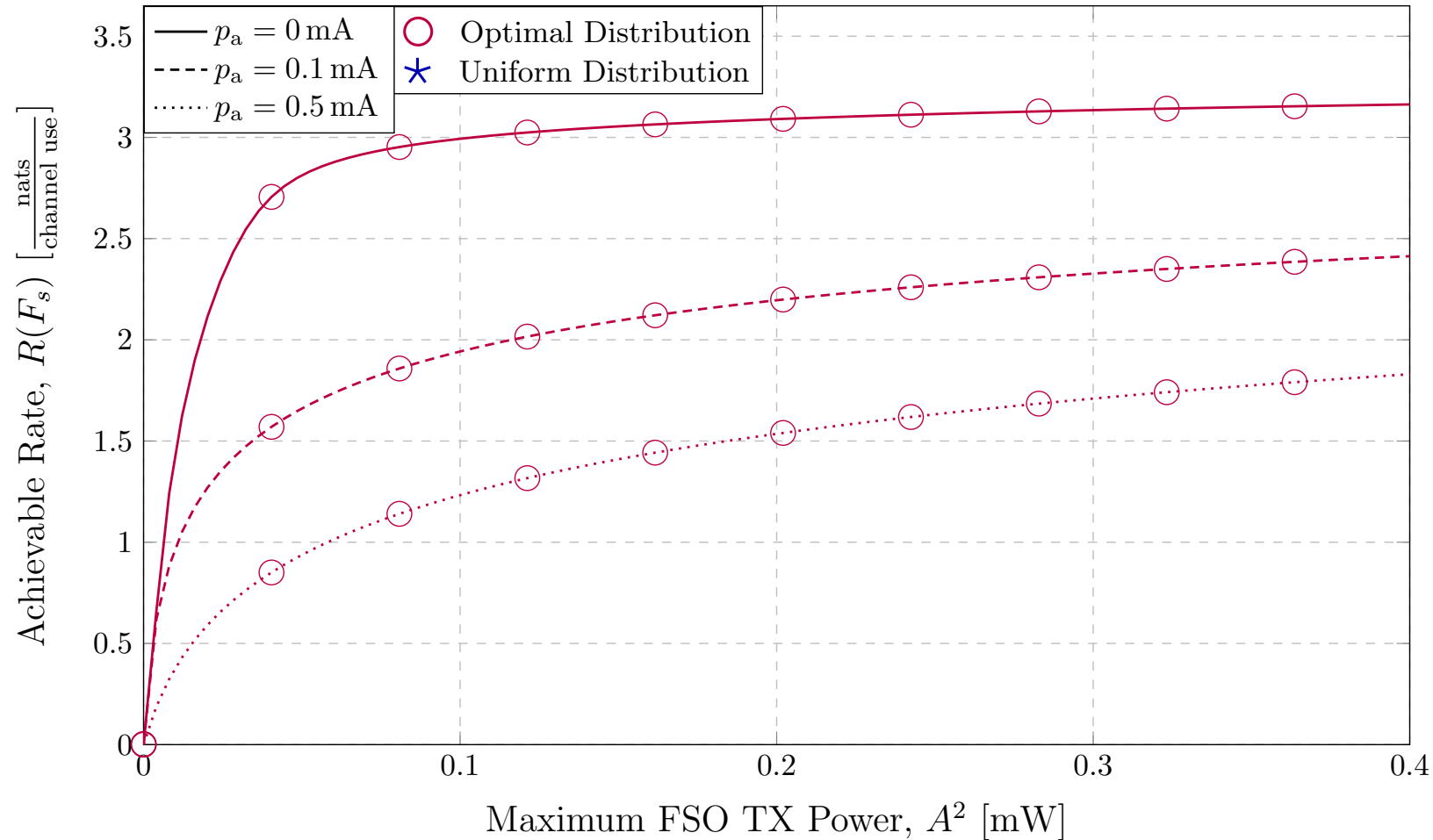


Figure: Achievable rates for different cdfs F_s , maximum TX powers A^2 , and ambient light intensities p_a

Achievable Rates

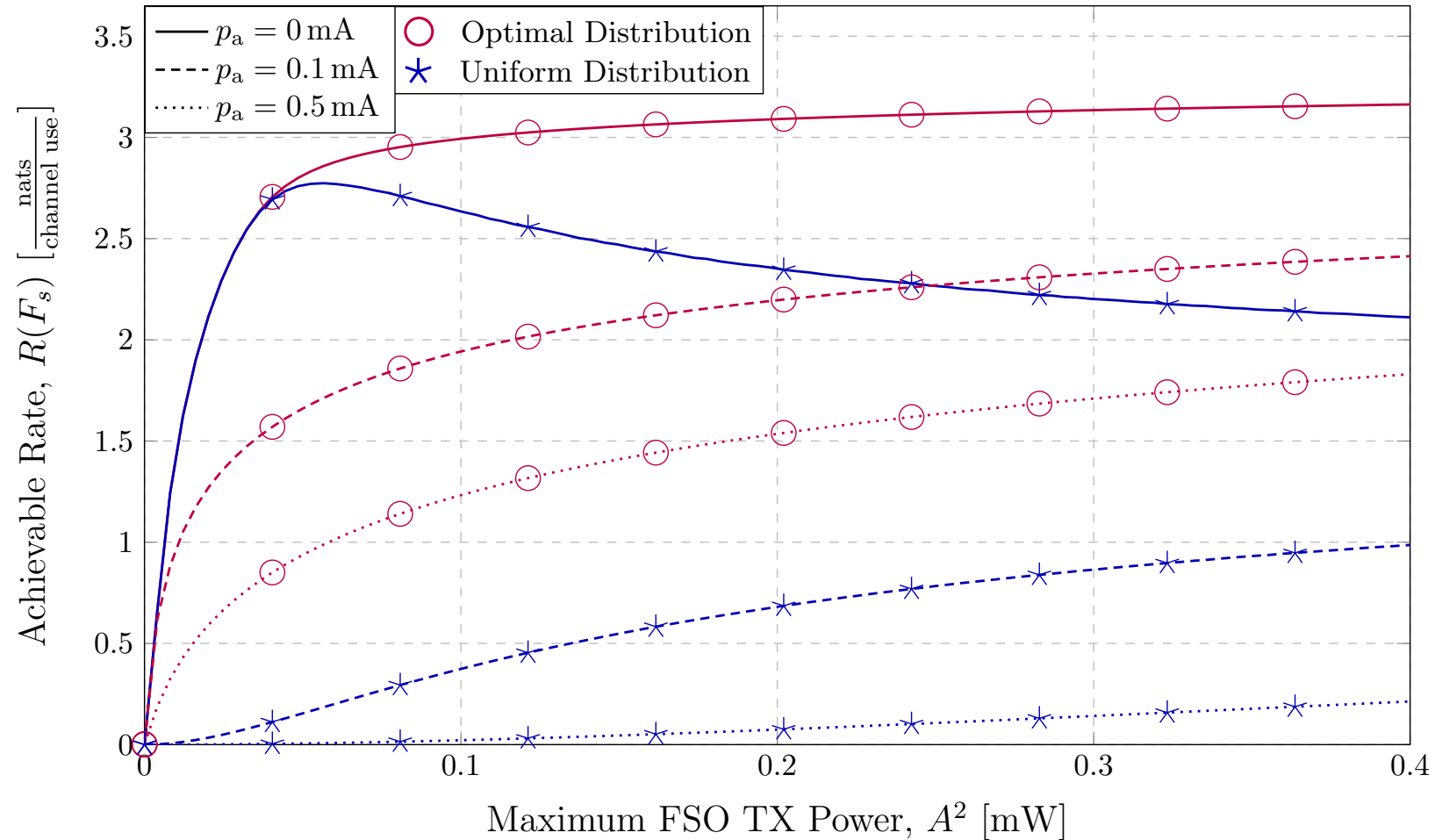


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