



2026 IEEE 26th International Conference on **COMMUNICATION TECHNOLOGY**

📅 October 16-18, 2026 📍 Zhuhai, China

Conference Program





ORGANIZING COMMITTEES >>>

Conference General Chair



Hongke Zhang

Beijing Jiaotong University,
China

Conference Co-chairs



Guanghua Yang

Jinan University, China



Geyong Min

University of Exeter, UK



George Karagiannidis

Aristotle University of
Thessaloniki, Greece

Technical Program Committee Chairs



Tony Quek

Singapore University of
Technology and Design,
Singapore



Gang Feng

University of Electronic
Science and Technology of
China, China



Shaodan Ma

University of Macau, China

Technical Program Committee Co-chairs



Haijun Zhang

University of Science and
Technology Beijing, China



Yang Yang

The Hong Kong University of
Science and Technology
(Guangzhou), China



Zheng Shi

Jinan University, China



Organizing Committee Co-chair



Zhi Chen

University of Electronic Science
and Technology of China, China

Organizing Committee Members



Jintao Wang

University of Macau, China



Xiaofan Li

Jinan University, China



Xu Wang

Jinan University, China



Shancheng Zhao

Jinan University, China



Zhiquan Liu

Jinan University, China

Publicity Chairs



Huaxi Gu

Xidian University, China



Pingping Zhang

South China Normal
University, China



Yao Sun

University of Glasgow, UK

Industrial Forum Chairs



Xiangyang Duan

ZTE Corporation, China



Guangyi Liu

The Research Institution of
China Mobile, China



Chenhua Sun

The 54th Research Institute of
China Electronics Technology
Group Corporation, China



Jianhua Tang

Shenzhen Smart City Group,
China

Special Session Organizing Chairs



Hongfang Yu

University of Electronic Science
and Technology of China, China



Xianda Wu

South China Normal
University, China

Publication Chairs



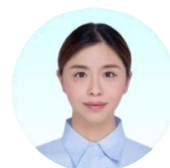
Chuan Zhang

Southeast University, China



Yun Li

Chongqing University of
Posts and
Telecommunications, China



Jianhong Zhou

Xihua University, China

Tutorial Chairs



Yijing Liu

University of Electronic Science
and Technology of China, China



Di Wang

Jinan University, China



Hang Liu

University of Macau, China

CONFERENCE VENUE >>>



珠海华发喜来登酒店 SHERATON ZHUHAI HOTEL

地址：中国广东省珠海市香洲区湾仔银湾路 1663 号
Address: No.1663, Yinwan Road, Wanzai Xiangzhou District, Zhuhai, Guangdong, 519000, China

Transportation Guideline



Zhuhai Jinwan Airport

29.4 km by car from the hotel, about 34 minutes.



Hengqin North Station

4.8 km by car from the hotel, about 9 minutes.

Hengqin Station

5.9 km by car from the hotel, about 11 minutes.

Zhuhai Station

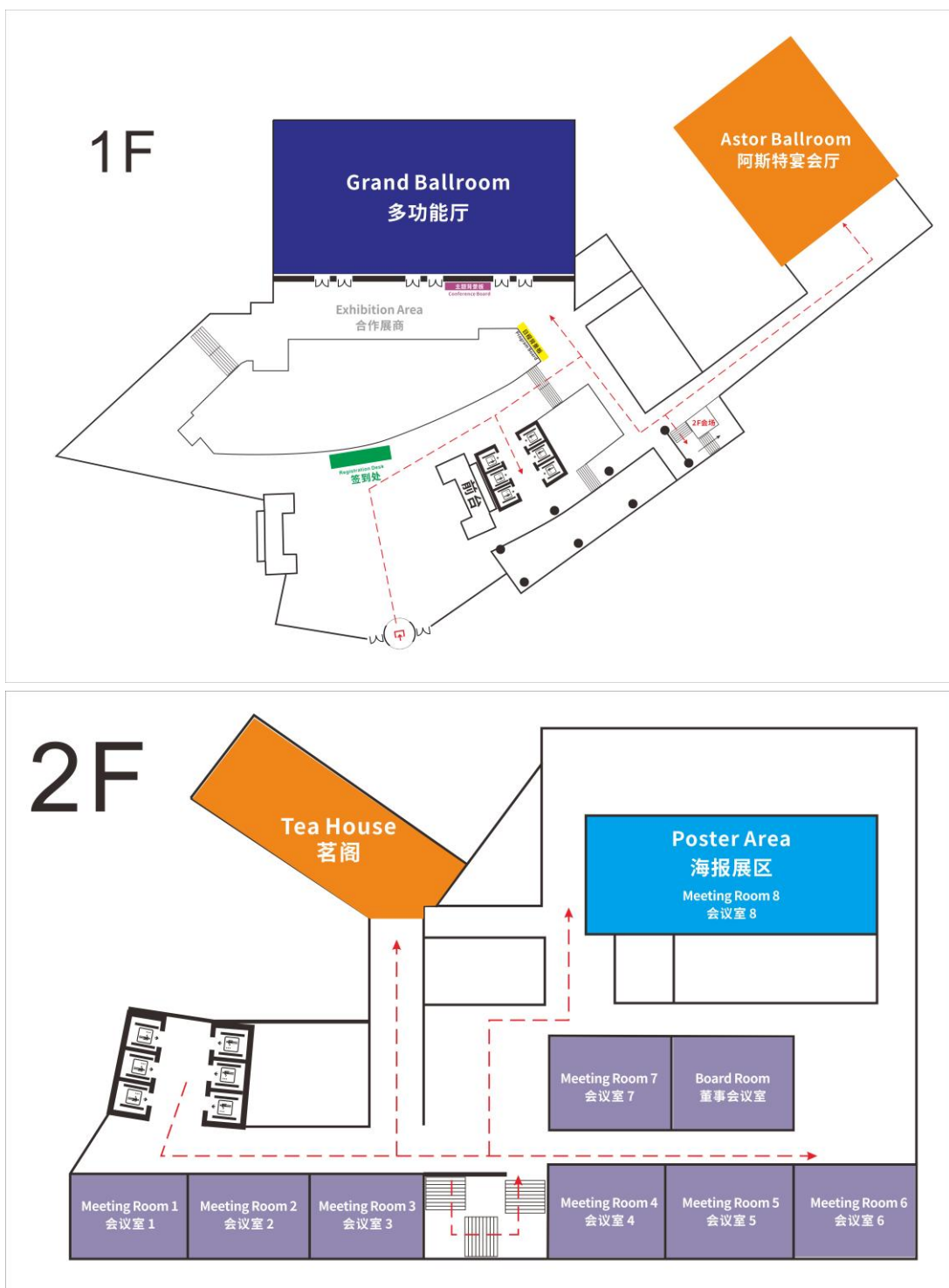
7.9 km by car from the hotel, about 14 minutes.

Conference Rooms

	Meeting Rooms	Oct. 16	Oct. 17	Oct. 18
	Grand Ballroom	/	Opening Ceremony Keynote Speech	Keynote Speech
	Meeting Room 1	Tutorial 1、3	Onsite Session 1、9	Onsite Session 17、24
	Meeting Room 2	Tutorial 4、2	Onsite Session 2、10	Onsite Session 18、25
	Meeting Room 3	/	Onsite Session 3、11	Onsite Session 19、26
	Meeting Room 4	/	Onsite Session 4、12	Onsite Session 20、27
	Meeting Room 5	/	Onsite Session 5、13	Onsite Session 21、28
	Meeting Room 6	/	Onsite Session 6、14	Onsite Session 22、29
	Meeting Room 7	/	Onsite Session 7、15	Onsite Session 23
	Board Room	/	Onsite Session 8、16	/
	Poster Area- Meeting Room 8	/	Poster Session 1 Poster Session 2	Poster Session 3 Poster Session 4
	2F Tea House	Dinner	/	/
	1F Astor Ballroom	/	Lunch	Lunch/Dinner
	1F Grand Ballroom	/	Banquet	/



FLOOR PLAN >>>





CONFERENCE GUIDELINES >>>

Sign-In



Oct. 16 | 10:00-18:00 | Lobby
Oct. 17 | 09:00-18:00 | Lobby
Oct. 18 | 09:00-18:00 | Lobby

Conference Catering



Oct. 16 | Dinner | 18:30-20:30 | 2F Tea House
Oct. 17 | Lunch | 12:00-13:30 | 1F Astor Ballroom
Oct. 17 | Banquet | 18:30-21:00 | 1F Grand Ballroom
Oct. 18 | Lunch | 12:00-13:30 | 1F Astor Ballroom

Oral Presentation



1. The duration of the presentation slot is 15 minutes. Please target your lecture for a duration of about 10 minutes for the presentation plus about 5 minutes for questions from the audience.
2. Your punctual arrival and active involvement in each session will be highly appreciated. Get your presentation PPT or PDF files prepared and backed up.
3. Laptops, projector & screen, and laser sticks will be provided by the conference organizer.

Poster Presentation



It's expected that at least one author stands by the poster for (most of the time of) the duration of the poster session. This is essential both to present your work to anyone interested in it and to make sure that your presence is verified by committee.

Online Presentation



Zoom Link A: <https://us02web.zoom.us/j/86863206117>, Zoom ID: 86863206117
Zoom Link B: <https://us02web.zoom.us/j/86890280564>, Zoom ID: 86890280564
Zoom Link C: <https://us02web.zoom.us/j/89148177352>, Zoom ID: 89148177352
Password for all Zoom: 101618
Time Zone: GMT+8

Security



Please ensure that you always take your belongings with you when leaving a room. Do not leave bags or laptops unattended.



AGENDA OVERVIEW >>>

DAY 01	Friday, Oct. 16, 2026 - Onsite	
Time	Activity	Venue
10:00-18:00	Sign-in & Conference Materials Collection	Lobby
14:00-16:00	Tutorial 1 - Towards Computation-Efficient NTN: Routing, Scheduling, Slicing and Federated Learning	Meeting Room 1
14:00-16:00	Tutorial 4 - Digital Twin Networks: Toward Intelligent and Autonomous Networking	Meeting Room 2
16:00-16:30 Coffee Break		
16:30-18:30	Tutorial 3 - Methods and Performance Evaluation Metrics of Wireless Channel Map Constructions for 6G and Beyond	Meeting Room 1
16:30-18:30	Tutorial 2 - High-Capacity Optical Communications Using Space-Division Multiplexing	Meeting Room 2
18:30-20:30	Dinner	2F Tea House
DAY 01	Friday, Oct. 16, 2026 - Online	
Time	Activity	Venue
10:00-16:00	Online Testing Online Session 1 & Online Session 2 & Online Session 3	Room A 86863206117 Password: 101618
10:00-16:00	Online Testing Session Chair & Online Session 4 & Online Session 5	Room B 86890280564 Password: 101618

DAY 02	Saturday, Oct. 17, 2026	
Time	Activity	Venue
09:00-18:00	Sign-in & Conference Materials Collection	Lobby
Opening Ceremony Host: Zheng Shi, Professor, Jinan University		
09:00-09:10	Opening Remarks Hongke Zhang, Academician of the Chinese Academy of Engineering, Beijing Jiaotong University, China	Grand Ballroom
09:10-09:15	Special Address Nanyin Huang, Director of the Zhuhai Science and Technology Innovation Bureau	Grand Ballroom
09:15-09:20	Welcome Address	Grand Ballroom



	Guanghua Yang, Jinan University, China	
09:20-09:25	TPC Chair Address Gang Feng, Professor, University of Electronic Science and Technology of China, China	Grand Ballroom
09:25-09:30	Group Photo	
Keynote Speech Host: Zheng Shi, Professor, Jinan University		
09:30-10:15	Generative AI Redefines Intelligence in Wireless Networking Shuguang Cui The Chinese University of Hong Kong, Shenzhen, China	Grand Ballroom
10:15-10:30 Coffee Break		
10:30-11:15	Integrated Sensing and Backscatter Communications for Low-Altitude Economy Ying-Chang Liang University of Electronic Science and Technology of China, China	Grand Ballroom
11:15-12:00	Score-Empowered 6G Integrated Sensing and Communications: When Wireless Meets Generative Modeling Yingjun Zhang The Chinese University of Hong Kong, China	Grand Ballroom
12:00-13:30	Lunch Time	1F Astor Ballroom
Title		
13:30-15:35	Onsite Session 1-Track 15 Topic: Aerial Communications, UAV Communications, Vehicular Networks (I) Session Chair: Haixia Peng, Xi'an Jiaotong University, China Invited Speaker-Congduan Li ET1019, ET2176, ET2248, ET2192, ET1051, ET3348, ET4429	Meeting Room 1
13:30-15:25	Onsite Session 2-Track 12 Topic: Optical Communications and Networks & RF/Microwave Circuits (I) Session Chair: Suzhi Bi, Shenzhen University, China Invited Speaker-Zhaopeng Xu, Invited Speaker-Chenbo Zhang ET3288, ET1090, ET3271, ET3383, ET1068	Meeting Room 2
13:30-15:55	Onsite Session 3-Track 2 Topic: Signal Processing for Communications (I) Session Chair: Wei Wang, Zhejiang University, China Invited Speaker-Si-Yu Zhang, Invited Speaker-Zhuang Xie	Meeting Room 3



	ET2215, ET2153, ET1103, ET4460, ET3385, ET2246, ET1052	
13:30-15:50	Onsite Session 4-Track 11 Topic: Communication QoS, Reliability & Modeling Session Chair: Ding Shi, Purple Mountain Laboratories, China Invited Speaker-Feng Wang, Invited Speaker-Shengyu Zhang, Invited Speaker-Peng Wang, Invited Speaker-Ke Zhang ET2136, ET3424, ET3291, ET3258	Meeting Room 4
13:30-15:30	Onsite Session 5-Track 3 Topic: Integrated Sensing and Communication (III) Session Chair: Xufang Wang, Fujian Normal University, China Invited Speaker-Yongcheng Li, Invited Speaker-Xufang Wang, Invited Speaker- Zhiqiang Xiao ET2149, ET2198, ET3290, ET4495	Meeting Room 5
13:30-15:40	Onsite Session 6-Track 5 Topic: AI for Communications and Networks (I) Session Chair: Gaoyang Liu, Huazhong University of Science and Technology, China Invited Speaker-Yu Huang, Invited Speaker-Yijing Liu ET1106, ET2203, ET3251, ET1067, ET3427, ET3416	Meeting Room 6
13:30-15:35	Onsite Session 7-Track 9 Topic: Space-Air-Ground Communication and Space Networking (I) Session Chair: Cui-Qin Dai, Chongqing University of Posts and Telecommunications, China Invited Speaker-Cui-Qin Dai ET1078, ET2147, ET2233, ET3335, ET4480, ET4506, ET4498	Meeting Room 7
13:30-15:25	Onsite Session 8-Track 1 Topic: Communication and Information Theory (I) Session Chair: Yao Sun, University of Electronic Science and Technology of China, China Invited Speaker-Hai-Peng Ren, Invited Speaker-Yi Fang ET1044, ET2150, ET1072, ET3419, ET4501	Board Room
13:30-15:30	Poster Session 1 Topic: Signal Processing, Information Theory and Integrated Sensing Session Chair: Yongmin Li, Shanxi University, China ET1012, ET1093, ET2212, ET2236, ET4461, ET1022, ET1040,	Poster Area Meeting Room 8



	ET1050, ET1069, ET1073, ET1074, ET1082, ET1083, ET1087, ET1104, ET2138, ET2156, ET2181, ET2183, ET3259, ET3283, ET3304, ET3309, ET3317, ET3373, ET3381, ET3398, ET3426, ET4497, ET4510, ET1015, ET1056, ET1065, ET2131, ET2146, ET2175, ET2178, ET2195, ET2213, ET2247, ET3273, ET3312, ET3339, ET3351, ET4484	
15:30-16:00 Coffee Break		
16:00-18:05	Onsite Session 9-Track 7 & Track 13 Topic: Mobile, Wireless and Green Communication Networks (I) Session Chair: Siyu Zhang, Beijing Information Science & Technology University, China Invited Speaker-Xinyue Pei ET2232, ET2222, ET1100, ET3388, ET3367, ET3338, ET4431	Meeting Room 1
16:00-18:00	Onsite Session 10-Track 7 & Track 13 Topic: Mobile, Wireless and Green Communication Networks (II) Session Chair: Jiachen Sun, The Hong Kong University of Science and Technology, China ET2199, ET2225, ET3308, ET3368, ET2112, ET2157, ET4493, ET4432	Meeting Room 2
16:00-18:05	Onsite Session 11- Track 14 & SS3 Topic: Reconfigurable Intelligent Surfaces and Non-Terrestrial Networks Session Chair: Peng Wang, Singapore University of Technology and Design, Singapore Invited Speaker-Ding Shi ET2194, ET1075, ET1088, ET2164, ET3253, ET3400, ET3387	Meeting Room 3
16:00-18:00	Onsite Session 12-Track 8 & Track 6 Topic: Internet-of-Things, Sensor Networks and Edge Computing (I) Session Chair: Zhuang Xie, National University of Defense Technology, China ET1077, ET1084, ET2116, ET2114, ET3292, ET4474, ET1035, ET3310	Meeting Room 4
16:00-18:15	Onsite Session 13-Track 4 Topic: Intelligent and Semantic Communications Session Chair: Hai-Peng Ren, National Key Laboratory of Land & Air Based Information Perception & Control, China	Meeting Room 5



	Invited Speaker-Suzhi Bi, Invited Speaker-Yao Sun, Invited Speaker-Celimuge Wu ET3363, ET3371, ET4450, ET4505, ET3379	
16:00-18:00	Onsite Session 14-Track 10 Topic: Communication and Information Security Session Chair: Youyang Xiang, Institute of Electronic Engineering, China Academy of Engineering Physics, China Invited Speaker-Yongmin Li, Invited Speaker-Gaoyang Liu, Invited Speaker-Gang Yang ET2206, ET2151, ET3289, ET4512	Meeting Room 6
16:00-18:00	Onsite Session 15-SS4 Topic: Wireless Edge Computing, Caching, and Distributed Intelligence Session Chair: Jie Tian, Shandong Normal University, China Invited Speaker-Jie Tian, Invited Speaker-Dongyang Li, Invited Speaker-Xiaotian Zhou ET3378, ET3341, ET3296, ET4435	Meeting Room 7
16:00-18:05	Onsite Session 16-Track 15 Topic: Aerial Communications, UAV Communications, Vehicular Networks (II) Session Chair: Yan Zhang, Beijing Institute of Technology, China Invited Speaker-Yan Zhang ET1064, ET2154, ET2220, ET2145, ET3323, ET4451, ET903	Board Room
16:00-18:00	Poster Session 2 Topic: AI for Communications, Space-Air-Ground and IoT Networks Session Chair: Xiaofan Li, Jinan University, China ET3392, ET4465, ET2144, ET3382, ET4507, ET1031, ET1054, ET1061, ET2121, ET2148, ET2163, ET2208, ET2211, ET2237, ET3262, ET3266, ET3282, ET3311, ET3377, ET3404, ET4459, ET4472, ET2242, ET4475, ET1013, ET2113, ET2219, ET2243, ET3270, ET3324, ET2110, ET2118, ET2162, ET2173, ET2184, ET2228, ET2235, ET3295, ET3337, ET3355, ET3359, ET3407, ET3428, ET4453, ET4523, ET3254, ET4513, ET4500	Poster Area Meeting Room 8
18:30	Banquet	1F Grand Ballroom

DAY 03	Sunday, Oct. 18, 2026 (Onsite)	
Time	Activity	Venue



09:00-18:00	Sign-in & Conference Materials Collection	Lobby
Keynote Speech Host: Yingjun Zhang, The Chinese University of Hong Kong, China		
09:30-10:15	<i>Flexible Coupler Antenna for Wireless Networks: Opportunities and Challenges</i> Xuemin (Sherman) Shen University of Waterloo, Canada	Grand Ballroom
10:15-11:00	<i>Pervasive Sensing and Connectivity for Real-Time and Embodied Intelligence</i> Sumei Sun Institute for Infocomm Research (I2R), Agency for Science, Technology and Research (A*STAR), Singapore	Grand Ballroom
11:00-11:15 Coffee Break		
11:15-12:00	<i>Energy-Efficient Design for Movable Antenna-Aided MU-MIMO Systems</i> Chengwen Xing Beijing Institute of Technology, China	Grand Ballroom
12:00-13:30	Lunch Time	1F Astor Ballroom
Parallel Sessions		
13:30-15:10	<i>Onsite Session 17-Track 1</i> Topic: Communication and Information Theory (II) Session Chair: Xiaoqian Li, The University of Electronic Science and Technology of China Invited Speaker-Tao Zhang, Invited Speaker-Xiaoqian Li ET2189, ET2224, ET1027, ET3405	Meeting Room 1
13:30-15:35	<i>Onsite Session 18-Track 15</i> Topic: Aerial Communications, UAV Communications, Vehicular Networks (III) Session Chair: Fangzhou Zhao, School of Electrical and Electronic Engineering, North China Electric Power University (NCEPU), China Invited Speaker-Fangzhou Zhao ET2177, ET2205, ET2186, ET2185, ET3293, ET3333, ET4486	Meeting Room 2
13:30-15:30	<i>Onsite Session 19-Track 5</i> Topic: AI for Communications and Networks (II) Session Chair: Long Luo, University of Electronic Science and Technology of China, China Invited Speaker-Shuai Wang, Invited Speaker- Shuaifei Chen,	Meeting Room 3



	Invited Speaker-Long Luo ET2123, ET2245, ET3399, ET4520	
13:30-15:20	Onsite Session 20-Track 9 Topic: Space-Air-Ground Communication and Space Networking (II) Session Chair: Kainan Wang, Wuhan University, China Invited Speaker-Kainan Wang ET2135, ET2115, ET3301, ET4438, ET3414, ET3361	Meeting Room 4
13:30-15:20	Onsite Session 21-Track 3 Topic: Integrated Sensing and Communication (I) Session Chair: Fei Li, Nanjing University of Posts and Telecommunications, China Invited Speaker-Chenglong Li ET1081, ET1009, ET2207, ET2124, ET4494, ET3330	Meeting Room 5
13:30-15:55	Onsite Session 22-Track 2 Topic: Signal Processing for Communications (II) Session Chair: Xiaoqiang Hua, National University of Defense Technology, China Invited Speaker-Chen Huang, Invited Speaker-Xiaoqiang Hua ET2201, ET3345, ET2210, ET4458, ET3406, ET3264, ET2238	Meeting Room 6
13:30-15:05	Onsite Session 23-Track 12 Topic: Optical Communications and Networks & RF/Microwave Circuits (II) Session Chair: Xinwei DU, Beijing Normal-Hong Kong Baptist University, China Invited Speaker-Tianshun Wang, Invited Speaker-Zuqing Zhu, Invited Speaker-Weiqiang Sun, Invited Speaker-Tao Yang ET3344	Meeting Room 7
13:30-15:30	Poster Session 3 Topic: Communication Security, Optical Networks and Advanced Wireless Systems Session Chair: Xu Wang, Jinan University, China; Yijing Liu, University of Electronic Science and Technology of China, China ET4454, ET4478, ET4479, ET4485, ET1023, ET1034, ET1066, ET1092, ET2126, ET2167, ET3343, ET3410, ET4462, ET2168, ET3256, ET3403, ET4448, ET4470, ET1021, ET3300, ET3349, ET3360, ET3393, ET3423, ET4471, ET4509, ET2119, ET2132, ET2193, ET2190, ET2229, ET2240, ET3375, ET1016, ET1063,	Poster Area Meeting Room 8



	ET1070, ET1080, ET1094, ET1097, ET1109, ET2120, ET2170	
15:30-16:00 Coffee Break		
16:00-18:00	Onsite Session 24-Track 8 & Track 6 Topic: Internet-of-Things, Sensor Networks and Edge Computing (II) Session Chair: Chenglong Li, National University of Defense Technology, China ET2209, ET2117, ET2188, ET3299, ET4477, ET1039, ET2202, ET1036	Meeting Room 1
16:00-17:35	Onsite Session 25-Track 5 Topic: AI for Communications and Networks (III) Session Chair: Xiaoqian Li, The University of Electronic Science and Technology of China Invited Speaker-Fei Li ET1042, ET2234, ET3374, ET3421, ET4519	Meeting Room 2
16:00-17:50	Onsite Session 26-Track 9 Topic: Space-Air-Ground Communication and Space Networking (III) Session Chair: Dongdong Wang, National Key Laboratory of Advanced Communication Networks, China Invited Speaker-Dongdong Wang ET2197, ET2204, ET3415, ET3322, ET3357, ET3318	Meeting Room 3
16:00-17:50	Onsite Session 27-Track 3 Topic: Integrated Sensing and Communication (II) Session Chair: Chen Huang, Purple Mountain Laboratories & Southeast University, China Invited Speaker-Han Wu ET1085, ET1096, ET2230, ET2244, ET3332, ET2142	Meeting Room 4
16:00-17:30	Onsite Session 28-Track 2 Topic: Signal Processing for Communications (III) Session Chair: Shuaifei Chen, Purple Mountain Laboratories & Southeast University, China ET1071, ET1058, ET1102, ET3305, ET3386, ET4467	Meeting Room 5
16:00-17:50	Onsite Session 29-Track 12 Topic: Optical Communications and Networks & RF/Microwave Circuits (III) Session Chair: Feiyu Li, Information Support Force Engineering University, China Invited Speaker-Huatao Zhu, Invited Speaker-Qimei Chen,	Meeting Room 6



	Invited Speaker-Jian Zhao, Invited Speaker-Xin Li ET4468, ET4524	
16:00-18:00	Poster Session 4 Topic: Aerial & Vehicular Networks, Special Session Topics and General Contributions Session Chair: Simeng Feng, Nanjing University of Aeronautics and Astronautics, China ET2200, ET2217, ET3294, ET3315, ET3329, ET3331, ET3347, ET3394, ET4433, ET4492, ET4496, ET2174, ET3340, ET2165, ET2171, ET3252, ET3285, ET4511, ET3272, ET2161, ET3255, ET3287, ET3425, ET4436, ET3365, ET4456, ET2172, ET3297, ET3354, ET4483, ET2137, ET3280, ET3303, ET3307, ET3334, ET3369, ET3376, ET3395, ET3418, ET3362	Poster Area- Meeting Room 8
18:30	Dinner	1F Astor Ballroom

DAY 03 Sunday, Oct. 18, 2026 (Online)		
Time	Activity	Venue
13:30-16:05	Online Oral Session 1 Topic: Signal Processing and Integrated Sensing and Communication Session Chair: Chuanting Zhang, Shandong University, China Invited Speaker-Yanqing Xu ET1006, ET1008, ET1032, ET1101, ET2160, ET2187, ET3413, ET3274, ET2239	Room A 86863206117 Password: 101618
13:30-15:45	Online Oral Session 2 Topic: AI for Communications and Emerging Computing Paradigms Session Chair: Yifeng Lyu, Institute of Computer Application Technology, Norinco Group ET901, ET902, ET1086, ET1105, ET2129, ET2140, ET3298, ET4473, ET3281	Room B 86890280564 Password: 101618
15:45-16:00 Break		
16:10-18:40	Online Oral Session 3 Topic: Aerial, Vehicular and Mobile Wireless Networks Session Chair: Bo Li, Ningxia University, China ET1049, ET1091, ET3316, ET3353, ET3352, ET3411, ET4490, ET3397, ET2227, ET3401	Room A 86863206117 Password: 101618



16:00-18:30	Online Oral Session 4 Topic: Communication Security, QoS and Green Networking Session Chair: Lijun Zhang, E-surfing Vision Technology Co., Ltd, China Telecom ET3275, ET3412, ET3356, ET4481, ET4515, ET3358, ET3370, ET2226, ET2241, ET3320	Room B 86890280564 Password: 101618
16:00-18:30	Online Oral Session 5 Topic: Advances in Communication, Information, and Intelligent Networks Session Chair: Huifang Chen, Zhejiang University, China ET4489, ET3372, ET1057, ET3325, ET1079, ET3350, ET1062, ET1059, ET3384, ET4441	Room C 89148177352 Password: 101618

KEYNOTE SPEAKER >>>



Shuguang Cui

The Chinese University of Hong Kong, Shenzhen, China

09:30-10:15, Oct. 17, 2026 | Grand Ballroom

BIOGRAPHY

Shuguang Cui received his Ph.D in Electrical Engineering from Stanford University, California, USA, in 2005. Afterwards, he has been working as assistant, associate, full, Chair Professor in Electrical and Computer Engineering at the Univ. of Arizona, Texas A&M University, UC Davis, and CUHK at Shenzhen respectively. He was selected as the Thomson Reuters Highly Cited Researcher and listed in the Worlds' Most Influential Scientific Minds by ScienceWatch in 2014. He was the recipient of the IEEE Signal Processing Society 2012 Best Paper Award. He was elected as an IEEE Fellow in 2013, an IEEE ComSoc Distinguished Lecturer in 2014, and IEEE VT Society Distinguished Lecturer in 2019. In 2023, he won the IEEE Marconi Best Paper Award, got elected as a Fellow of both Canadian Academy of Engineering and the Royal Society of Canada, and started to serve as the Editor-in-Chief for IEEE Transactions on Mobile Computing. In 2024, he won the National 2nd Prize in Nature Science and 1st Science and Technology Prize from CIC of China. In 2026, his CVPR paper got a full mark, the CVPR Compute Transparency Champion Award, and the honor of Best Paper Finalist (0.37%).

TITLE

Generative AI Redefines Intelligence in Wireless Networking

Abstract: Currently, the most intelligent computation model is AI, more specifically Generative AI (GAI). In this talk, we discuss how to redefines the network intelligence by applying various GAI-driven approaches, across three layers: 1) How to better understand the wireless environment via AGI; 2) How to better control a wireless network via AGI; and 3) How to better manipulate user data via AGI.

KEYNOTE SPEAKER >>>



Ying-Chang Liang

University of Electronic Science and Technology of China,
China

10:30-11:15, Oct. 17, 2026 | Grand Ballroom

BIOGRAPHY

Ying-Chang Liang [IEEE Fellow] is a currently Professor at the University of Electronic Science and Technology of China. He was a Professor with the University of Sydney, Australia, and the Principal Scientist of the Institute for Infocomm Research (I2R), A*STAR, Singapore. His research interests include 5G/6G networks, cognitive radio, symbiotic radio, IoT, and AI. He is an elected Member at Large of the IEEE Communications Society's Board-of-Governors (2025-2027). He served the Founding Editor-in-Chief of the IEEE JSAC - Cognitive Radio Series (2011-2014), Chair of the Technical Committee on Cognitive Networks (2015-2016), and Editor-in-Chief of IEEE Transactions on Cognitive Communications and Networking (2019-2022). In addition, he served as TPC Chair and Executive Co-Chair of IEEE Globecom'17, TPC Co-Chair of IEEE Globecom'24, and General Chair of IEEE VTC2025-Fall. He received several research and publication awards, including the IEEE VTS Stuart Meyer Memorial Award (2025), IEEE ComSoc Award for Advances in Communications (2022), IEEE ComSoc Stephen O. Rice Prize (2021), and IEEE ComSoc TCCN Recognition Award (2018). He is a Fellow of IEEE, and a Clarivate Analytics' Highly Cited Researcher since 2014.

TITLE

Integrated Sensing and Backscatter Communications for Low-Altitude Economy

Abstract: In low altitude economy, communications, sensing and target identification are core requirements for the low altitude information network design. In this talk, backscatter communication is proposed for target identification, and multi-functional spectrum sharing is used to support integrated communications, sensing and identification (ISCI) with enhanced resource utilization efficiency.

KEYNOTE SPEAKER >>>



Yingjun Zhang

The Chinese University of Hong Kong, China

11:15-12:00, Oct. 17, 2026 | Grand Ballroom

BIOGRAPHY

Angela Yingjun Zhang received her Ph.D. degree from the Department of Electrical and Electronic Engineering, The Hong Kong University of Science and Technology. She joined the Department of Information Engineering, The Chinese University of Hong Kong in 2005, where she is now a professor. Prof. Zhang is now the Steering Committee Chair of IEEE Wireless Communication Letters, Director of IEEE ComSoc Asia Pacific Region Board, and member of IEEE VTS Fellow Evaluation Standing Committee. Previously, she served as Editor-in-Chief of IEEE Open Journal of the Communications Society, Chair of the Executive Editor Committee of IEEE Transactions on Wireless Communications, and member of IEEE ComSoc Fellow Evaluation Standing Committee. Prof. Zhang has served on the Organizing Committees of many top conferences, such as IEEE GLOBECOM, ICC, VTC, SmartgridComm, and was the Chair of IEEE ComSoc Technical Committee of Smart Grid Communications.

Prof. Zhang is a co-recipient of 2021 and 2014 IEEE ComSoc Asia Pacific Outstanding Paper Awards, 2013 IEEE SmartgridComm Best Paper Award, and 2011 IEEE Marconi Prize Paper Award on Wireless Communications. As the only winner from engineering science, Prof. Zhang won the Hong Kong Young Scientist Award 2006, conferred by the Hong Kong Institute of Science.

TITLE

**Score-Empowered 6G Integrated Sensing and Communications:
When Wireless Meets Generative Modeling**

Abstract: Integrated sensing and communications (ISAC) is a key enabling technology for 6G, but its performance depends critically on prior knowledge of targets, environments, and propagation conditions. Conventional approaches often rely on simple parametric priors, which may fail to capture complex and non-Gaussian wireless statistics. In this talk, we introduce a score-empowered ISAC framework that uses learned score functions to represent complex priors while retaining physics-based sensing and communication models. A score function is the gradient of a distribution's log-density, learnable from data to capture statistical structures such as non-Gaussianity and multimodality. We first discuss how score functions can characterize sensing performance and enable prior-aware physical-layer design and optimization. We then show how learned score priors can be



embedded into Bayesian inference algorithms to improve efficiency and accuracy. Overall, this framework provides a unified interface between data-driven learning and model-based wireless design, and highlight promising directions toward intelligent and adaptive 6G sensing and communication systems.



KEYNOTE SPEAKER >>>



Xuemin (Sherman) Shen

University of Waterloo, Canada

09:30-10:15, Oct. 18, 2026 | Grand Ballroom

BIOGRAPHY

Xuemin (Sherman) Shen is a University Professor at the University of Waterloo, Canada. His research interests include network resource management, wireless network security, AI for networks, and future communication systems. Professor Shen is the Technical Program Committee Chair for IEEE Globecom'24, Globecom'16, IEEE Infocom14, and IEEE VTC'10 Fall. He was the Editor-in-Chief of the IEEE Internet of Things Journal, IEEE Network, and IET Communications. Professor Shen served as the 2022-2023 President of IEEE Communications Society. He is a Fellow of the IEEE, Royal Society of Canada, Canadian Academy of Engineering, and Engineering Institute of Canada, a Foreign Member of Chinese Academy of Engineering, and an International Fellow of the Engineering Academy of Japan.

TITLE

Flexible Coupler Antenna for Wireless Networks: Opportunities and Challenges

Abstract: The flexible coupler antenna (FCA) is a potentially innovative technology for 6G wireless networks. It leverages spatial variations in wireless channels by adjusting the positions or orientations of low-cost passive couplers around fixed active antennas, thereby enhancing network performance. In this presentation, we first introduce the signal and channel models for FCA, considering practical hardware constraints. We then highlight its performance advantages as compared with fixed-position active antennas and other reconfigurable MIMO technologies. Finally, we discuss the key challenges in FCA-based wireless networks and outline promising research directions to fully realize the potential of FCA for 6G systems.

KEYNOTE SPEAKER >>>



Sumei Sun

Institute for Infocomm Research (I2R), Agency for Science, Technology and Research (A*STAR), Singapore

10:15-11:00, Oct. 18, 2026 | Grand Ballroom

BIOGRAPHY

Dr Sumei Sun is the Executive Director of the Institute for Infocomm Research (I2R), A*STAR, Singapore. A*STAR I2R focuses on multi-disciplinary digital technologies research including artificial intelligence (AI), communications and connectivity, and cyber security. Sumei's current research interests include next-generation wireless communications, joint sensing-communications-computing-control, and applied AI. She holds a joint appointment with the Singapore Institute of Technology, and an adjunct appointment with the National University of Singapore, both as a full professor.

Sumei is a Fellow of the IEEE and Fellow of the Academy of Engineering Singapore. She's recipient of the IEEE ComSoc Donald W. McLellan Meritorious Service Award 2024, IEEE ComSoc Inaugural Asia Pacific Women in Communications Engineering Outstanding Achievement Award (2024), 2023 IEEE VTS Women's Distinguished Career Award, and Singapore National Day 2022 Public Administration Medal (Bronze). She served/serves as an elected Board of Governors member of the IEEE Communications Society and IEEE Vehicular Technology Society, Chair of the IEEE Communications Society Fellow Evaluation Committee, and a number of editorial boards.

TITLE

Pervasive Sensing and Connectivity for Real-Time and Embodied Intelligence

Abstract: Digitalization, decarbonization, intelligence, automation, and autonomy are driving the next frontier of industrial transformation. Realizing this vision requires high-fidelity real-time sensing, pervasive connectivity, network-native AI, and connected and embodied intelligence seamlessly spanning the physical and digital worlds. AI-native integrated 5G and emerging 6G terrestrial and non-terrestrial networks (TN-NTN), along with other communication technologies will provide the intelligent connectivity fabric, enabling distributed sensing, collaborative intelligence, autonomous decision-making, and resilient edge-cloud orchestration for next-generation cyber-physical systems. Using maritime and aviation sectors as examples, this presentation will illustrate how AI and embodied AI is transforming traffic management, operational efficiency, safety, and decarbonization. It will highlight the critical role of high-fidelity spatio-temporal data in enabling real-time AI and



Hybrid Twins, and present a roadmap for AI-native 6G, network-native AI, and intelligent sensing as foundational technologies for connected real-time and embodied intelligence. The talk will conclude with emerging research opportunities and future directions toward pervasive sensing, and ubiquitous connectivity for connected and embodied intelligence.

KEYNOTE SPEAKER >>>



Chengwen Xing

Beijing Institute of Technology, China

11:15-12:00, Oct. 18, 2026 | Grand Ballroom

BIOGRAPHY

Chengwen Xing is a Distinguished Professor at Beijing Institute of Technology, and a recipient of the National Science Fund for Distinguished Young Scholars of China. He received the B.Eng. degree from Xidian University, Xi'an, China, in 2005 and the Ph.D. degree from the University of Hong Kong, Hong Kong, China, in 2010. After completing his doctorate, he has been with the School of Information and Electronics, Beijing Institute of Technology, Beijing, China. His research focuses on array signal processing for space-air communications, and has published more than 200 papers in IEEE Transactions, and has won 2019 Second Prize of National Technology Invention, 2025 First Prize of Natural Science of China Institute of Communications, 2020 First Prize of Civil Aviation Science and Technology of China Air Transport Association.

TITLE

Energy-Efficient Design for Movable Antenna-Aided MU-MIMO Systems

Abstract: Movable antennas provide a new degree of freedom for wireless communications by exploiting spatial channel variations, but also introduce challenges such as strong coupling between antenna positions and transmission strategies, high-dimensional optimization variables, and severe non-convexity. To address these issues, this report investigates the energy-efficiency optimization problem in movable antenna-aided multi-user MIMO systems and proposes a general framework that accommodates various power constraints and practical antenna position constraints. By combining WMMSE and successive convex approximation techniques, the proposed approach effectively handles the non-convexity caused by position coupling. In addition, two low-complexity beamforming design strategies are developed to reduce the computational burden of conventional fractional programming methods.

TUTORIALS

Tutorial 1: Towards Computation-Efficient NTN: Routing, Scheduling, Slicing and Federated Learning

Corresponding Author: Tony Q.S. Quek, Singapore University of Technology and Design, Singapore

Time 14:00-16:00 | Oct. 16, 2026

Venue Meeting Room 1

SPEAKER 1



Peng Wang, Singapore University of Technology and Design, Singapore

Title: Time-varying Graph Based Routing and Scheduling for Computing-Efficient NTN

Bio.: Peng Wang received the B. Eng. and Ph.D degrees from Xidian University, Xi'an, China, in 2017 and 2023, respectively. He is currently a Post-Doctoral Research Fellow with Information Systems Technology and Design Pillar at the Singapore University of Technology and Design, where he was also a visiting Ph.D student from 2021.5 to 2022.11. His research interests include networking algorithms, scheduling and graph algorithms.

SPEAKER 2



Huiting Yang, Singapore University of Technology and Design, Singapore

Title: Network Slicing for Time-Varying Software-Defined NTN

Bio.: Huiting Yang received the B.E. degree in Communications Engineering, the M.S. degree in Space Science and Technology, and the Ph.D. degree in Communications Engineering from Xidian University, Xi'an, China, in 2015, 2018, and 2023, respectively. Currently, she is a Post-Doctoral Research Fellow with Information Systems Technology and Design Pillar at the Singapore University of Technology and Design (SUTD), where she was an International Research Visitor from 2022 to 2023. Her research interests include resource allocation for non-terrestrial networking, network slicing, and 6G.

SPEAKER 3



Qian Chen, The University of Hong Kong, China

Title: Federated Learning Schemes in NTN

Bio.: Qian Chen (Member, IEEE) received her B.E. and Ph.D. degrees in Information and Communication Engineering from Harbin Institute of Technology (HIT) in 2018 and 2023, respectively. She is currently a postdoctoral fellow in the Department of Electrical and Computer Engineering at the University of Hong Kong. Dr. Chen has been awarded several honors, including the National Scholarship, Outstanding Graduate of Heilongjiang Province and HIT, and the CSC Scholarship. Her doctoral research received the Excellent Doctoral Thesis Nomination Award by the China Education Society of Electronics. Her primary research interests include space-air-ground integrated networks and edge intelligence. She has served as the Student Chair of the IEEE ComSoc Harbin Chapter, Publication Chair for EAI WISATS 2024, and Youth Editorial Board Member of the Journal of Information and Intelligence.

TUTORIALS

Tutorial 4: Digital Twin Networks: Toward Intelligent and Autonomous Networking

Time 14:00-16:00 | Oct. 16, 2026

Venue Meeting Room 2

SPEAKER 1/Corresponding Author



Yan Zhang, University of Electronic Science and Technology of China, China

Title: Digital Twin Networks: Vision, Architecture and Fundamentals

Bio.: Prof. Yan Zhang is currently a Full Professor with the University of Electronic Science and Technology of China. Previously, he was full professor at University of Oslo, Norway. His research interests include next-generation wireless networks leading to 6G, green and secure cyber-physical systems. He is a fellow of IET and an Elected Member of the Academia Europaea (MAE), the Royal Norwegian Society of Sciences and Letters (DKNVS), and the Norwegian Academy of Technological Sciences (NTVA). He was a recipient of the Global Clarivate Analytics "Highly Cited Researcher" Award (Web of Science top 1 most cited worldwide). He is the Co-EiC of IEEE Transactions on Industrial Informatics, an Area Editor of IEEE Transactions on Green Communications and Networking, a Senior Editor of IEEE Systems Journal, and an associate editor of several IEEE Transactions/magazine.

SPEAKER 2



Yunlong Lu, Beijing Jiaotong University, China

Title: AI-Empowered Digital Twin Networks: Intelligence and Optimization

Bio.: Prof. Yunlong Lu received the Ph.D. degree in computer science from Beijing University of Posts and Telecommunications, Beijing, China, in 2020. From 2018 to 2019, he was a Visiting Ph.D. Student at the University of Oslo, Norway. He is currently a Full Professor with the School of Electronic and Information Engineering and the State Key Laboratory of Advanced Rail Autonomous Operation, Beijing Jiaotong University, China. His research interests include edge intelligence, wireless communications, and trustworthy mobile networks. He is a recipient of the IEEE Vehicular Technology Society Daniel E. Noble Fellowship Award, the IEEE Best Vehicular Electronics Paper Award, and the Capital Frontier Academic Achievement Award of China. He was selected for the China Association for Science and Technology (CAST) Young Elite Scientists Sponsorship Program and the Beijing Nova Program. He has served as an Editor and Guest Editor for several journals and as a Chair and Technical Program Committee Member for multiple IEEE conferences, including IEEE ICC, GLOBECOM, and VTC.

SPEAKER 3



Yaru Fu, Hong Kong Metropolitan University, China

Title: Digital Twin Networks: Emerging Applications and Future Directions

Bio.: Prof. Yaru Fu is an Associate Professor and Head of the Centre for Research in Advanced Network Technologies (CRANT) at Hong Kong Metropolitan University, Hong Kong, China. She received her Ph.D. degree in Electronic Engineering from the City University of Hong Kong in 2018. Her research interests include B5G/6G



technologies, digital twins, and machine learning. She has published over 130 papers in leading IEEE journals and conferences. Dr. Fu serves on the editorial boards of several IEEE journals, including IEEE Communications Surveys & Tutorials, IEEE Transactions on Cognitive Communications and Networking, and IEEE Internet of Things Journal. She has received several prestigious awards, including the IEEE WCL Best Editor Award (2021), IEEE GLOBECOM Best Paper Award (2024), and IEEE TCNC Exemplary Editor Award (2025). She has also been recognized among the World's Top 2% Scientists by Stanford University (2023–2025) and as a 2025 N2Women Rising Star.

TUTORIALS

Tutorial 3: Methods and Performance Evaluation Metrics of Wireless Channel Map Constructions for 6G and Beyond

Time 16:30–18:30 | Oct. 16, 2026

Venue Meeting Room 1

SPEAKER 1/Corresponding Author



Cheng-Xiang Wang, Southeast University & Purple Mountain Laboratories, China
Title: Methods and Performance Evaluation Metrics of Wireless Channel Map Constructions for 6G and Beyond - Part I

Bio.: Prof. Cheng-Xiang Wang received the B.Sc. and M.Eng. degrees in communication and information systems from Shandong University, China, in 1997 and 2000, respectively, and the Ph.D. degree in wireless communications from Aalborg University, Denmark, in 2004. He has been with Southeast University, China, as a professor since 2018 and he is now the Vice President of Southeast University. He is also a professor with Purple Mountain Laboratories, China. He was with Heriot-Watt University, Edinburgh, U.K., from 2005 to 2018. He has authored 4 books, 3 book chapters, and over 710 papers in refereed journals and conference proceedings, including 33 highly cited papers. He has also delivered 39 invited keynote speeches/talks and 24 tutorials in international conferences. His current research interests include wireless channel measurements and modeling, 6G intelligent communication networks, and electromagnetic information theory. Dr. Wang is a Member of the Academia Europaea, a Member of the European Academy of Sciences and Arts (EASA), a Fellow of the Royal Society of Edinburgh (FRSE), and IEEE.

SPEAKER 2



Jie Huang, Southeast University & Purple Mountain Laboratories, China
Title: Methods and Performance Evaluation Metrics of Wireless Channel Map Constructions for 6G and Beyond - Part II

Bio.: Dr. Jie Huang received the B.E. degree in Information Engineering from Xidian University, China, in 2013, and the Ph.D. degree in Information and Communication Engineering from Shandong University, China, in 2018. Since Mar. 2019, he is a part-time researcher in Purple Mountain Laboratories, China. Since Nov. 2020, he is an Associate Professor in the National Mobile Communications Research Laboratory, Southeast University. He has authored and co-authored more than 170 papers in refereed journals and conference proceedings. He received IEEE Neal Shepherd Memorial Best Propagation Paper Award in 2024 and 5 Best Paper Awards. He has delivered over 17 tutorials in international conferences, including IEEE Globecom and ICC. He is served as an Editor for IEEE TGCN and an Associate Editor for IEEE TVT. His research interests include millimeter wave, massive MIMO, reconfigurable intelligent surface channel measurements and modeling, and electromagnetic information theory.

**SPEAKER 3**

Junling Li, Southeast University & Purple Mountain Laboratories, China

Title: Methods and Performance Evaluation Metrics of Wireless Channel Map Constructions for 6G and Beyond - Part III

Bio.: Dr. Junling Li received the B.S. degree from Tianjin University, Tianjin, China, and the M.S. degree from the Beijing University of Posts and Telecommunications, Beijing, China, in 2013 and 2016, respectively. In 2020, she received the Ph.D. degree from the Department of Electrical and Computer Engineering, University of Waterloo, Waterloo, ON, Canada. She was a Joint Postdoctoral Research Fellow at Shenzhen Institute of Artificial Intelligence and Robotics for Society (AIRS), University of Waterloo, and the Chinese University of Hong Kong, Shenzhen from 2020 to 2022. She is currently an Associate Professor in the National Mobile Communications Research Laboratory at Southeast University, Nanjing, China. Dr. Li received the Best Paper Awards at the IEEE ICC 2019, ICCT 2023, and ICC 2025. Her research interests include digital twin, channel modeling, game theory, and machine learning based channel prediction.

TUTORIALS

Tutorial 2 - High-Capacity Optical Communications Using Space-Division Multiplexing

Time 16:30–18:30 | Oct. 16, 2026

Venue Meeting Room 2

SPEAKER 1



Jian Zhao, Tianjin University, China

Title: Space-Division Multiplexing via LP Modes: From Fiber Physics to High-Capacity Systems

Bio.: Jian Zhao received the B.Eng. degree in optoelectrical engineering from Tianjin University, Tianjin, China, in 2003, the M.S. degree in optics from Nankai University, in 2006, and the Ph.D. degree in electronics and information engineering from The Hong Kong Polytechnic University, in 2010. From 2016 to 2017, he was a visiting scholar of the CREOL, The College of Optics and Photonics, University of Central Florida. He is currently an Associate Professor with the School of Precision Instruments and Optoelectronics Engineering, Tianjin University. He has authored or coauthored more than 100 articles in peer-reviewed journals and leading international conferences. His current research interests include space division multiplexing, coherent optical fiber communications, optical artificial intelligence, optical computing and optical AI chip. He was also the PI of the National Key Research and Development Program of China. He has been selected for Tianjin's "131" Innovative Talent Project and Jiangsu Province Double Innovation Talent.

SPEAKER 2/Corresponding Author



Yang Yue, Xi'an Jiaotong University, China

Title: Orbital Angular Momentum-Enabled Optical Communications and Networks

Bio.: Yang Yue is a Professor at the School of Information and Communications Engineering, Xi'an Jiaotong University. He earned his Ph.D. from the University of Southern California (2012) following degrees from Nankai University. Dr. Yue's current research interest is intelligent photonics, including optical communications, optical perception, and optical chip. He has published >300 journal papers (including Science) and conference proceedings with >14,000 citations, two books (Elsevier, Springer Nature), eight edited books, two book chapters, >50 issued patents (including 30 U.S. patents and 6 European patents), >200 invited presentations (including 1 tutorial, >30 plenary and >100 keynote talks). Dr. Yue is a Fellow of Optica and SPIE. He is an Associate Editor for IEEE Access and Frontiers in Physics, Editor Board Member for four other scientific journals, Guest Editor for >10 journal special issues. He also served as Chair for >100 international conferences, Reviewer for >80 prestigious journals.

TECHNICAL SESSIONS >>>

TS01: Aerial Communications, UAV Communications, Vehicular Networks (I)

Session Chair: Haixia Peng, Xi'an Jiaotong University, China

Time 13:30-15:35 | Oct. 17, 2026

Venue Meeting Room 1

INVITED TALK | 13:30-13:50

A 3-D BDS/5G Integrated Positioning Methodology in D2D Communication Networks

Congduan Li, Sun Yat-sen University, China



Abstract: Intelligent navigation requires automated vehicles to integrate origin and destination data and dynamically plan routes based on real-time road conditions in practical applications. When automated vehicles encounter complex or challenging environments (e.g., narrow bridges or spaces between towering buildings), the number of visible satellites often decreases significantly, which may result in positioning failures. To address this issue, this paper proposes a three-dimensional integrated positioning methodology based on the BeiDou Navigation Satellite System, fifth-generation (5G) communications and device-to-device (D2D) networking. By means of information exchange between D2D communication terminals, the positioning accuracy of the terminals is effectively enhanced under both strong and weak satellite observation conditions.

TALK DETAILS

Time	Presentation
13:50-14:05 ET1019	Paper Title: Anisotropic Radial Scaling and Bayesian Optimization for Fixed-Wing UAV Closed-Loop Trajectory Design Author(s): Song Kaiwei, Shi Zhiyong, Zhang Ming, Li Lifu, Liu Jinghang, Tian Chunyuan Presenter: Song Kaiwei, Information Support Force Engineering University, China
	Abstract: In low-altitude wide-area coverage missions, predefined closed-loop trajectories for fixed-wing unmanned aerial vehicles (UAVs) often adapt poorly to non-uniform ground-node distributions, making weak-link protection difficult. This paper proposes a lightweight closed-loop trajectory design method that combines anisotropic radial scaling (ARS) with Bayesian optimization (BO). The method assigns independent scaling factors to convex-hull vertices to form a direction-dependent scaled boundary, and a rotated ellipse is then fitted to the scaled vertices to obtain a smooth closed cruise trajectory. The objective is to maximize the worst-case instantaneous rate over one trajectory period. Since the mapping from scaling parameters to communication performance is an expensive



black-box function, BO is adopted for sample-efficient search. Simulation results show that ARS-BO outperforms two geometric baselines, namely convex-hull and minimum-enclosing-circle trajectories, in both bottleneck-node performance and overall rate performance, with particularly clear gains under anisotropic node distributions.

Paper Title: Joint Optimization for Uplink-Downlink Flexible Decoupled Access in Heterogeneous C-V2X Communications

Author(s): Luofang Jiao, Pin Li, Qiang Cheng, Xingwei Ye, Jingbei Yang, Xianzhe Xu

Presenter: Luofang Jiao, Nanjing Research Institute of Electronics Technology, China

14:05-14:20
ET2176

Abstract: With the proliferation of connected vehicles in 5G and beyond (B5G) networks, heterogeneous cellular vehicle-to-everything (C-V2X) communications face critical challenges in achieving reliable, high-throughput transmissions, especially for cell-edge vehicles suffering from severe interference, path loss asymmetry, and uplink/downlink (UL/DL) performance imbalance. To enhance network performance, UL/DL decoupled access has emerged as a promising paradigm that allows vehicles to independently select different base stations (BSs) for UL and DL. However, existing works largely focus on either purely decoupled or purely coupled access, overlooking the practical scenario where vehicles near the cell core benefit from coupled access while cell-edge vehicles require decoupled access. To bridge this gap, this paper proposes a flexible UL/DL decoupled access framework for heterogeneous C-V2X networks that dynamically integrates both decoupled and coupled modes. Specifically, we formulate the joint optimization of radio resource allocation, transmit power control, and user association as a mixed-integer nonlinear programming (MINLP) problem, aiming to maximize UL/DL system throughput under quality-of-service constraints. By introducing auxiliary variables and applying successive convex approximation (SCA), we transform the non-convex MINLP into a sequence of standard convex subproblems and develop an efficient iterative algorithm to obtain a suboptimal solution. Extensive simulations demonstrate the effectiveness of the proposed framework. Results show that our method significantly outperforms baseline schemes based on nearest-distance, best-channel-gain, and purely coupled access in both UL and DL throughput across various vehicle densities.

14:20-14:35
ET2248

Paper Title: Multi-UAV Cooperative Deployment for Dense IoT Networks in Post-Disaster Emergency Scenarios

Author(s): Mingshuo Yao, Biling Zhang, Caili Guo

Presenter: Mingshuo Yao, Beijing University of Posts and Telecommunications, China

Abstract: This paper studies Unmanned Aerial Vehicle (UAV) deployment in post-disaster emergencies where all ground infrastructures are destroyed. UAVs are



prone to failure due to harsh weather, and dense heterogeneous IoT terminals need to be reliably served. To address these issues, UAVs employ multiple satellite links for reliable data backhaul. A bi-connection constraint ensures any two UAVs remain connected upon failures, allowing a UAV without satellite access to relay via neighbors, and a directed graph-based mechanism maintains this constraint during movement. The deployment problem is formulated as a nonlinear coverage maximization problem and solved via a K-means based Particle Swarm Optimization (KPSO) algorithm that also accounts for UAV failures. A priority-based access scheme assigns IoT terminals to UAVs considering both priority and load balancing to cope with dense IoT terminals. Simulations show that the proposed methods maintain coverage and redundancy even under UAV failures.

Paper Title: Frequency-Domain Channel-Calibrated MVDR Beamforming for Multi-UAV Cooperative GNSS Anti-Jamming

Author(s): Xiwen Hu, Suzhi Bi, Xiao-Hui Lin

Presenter: Xiwen Hu, Shenzhen University, China

14:35-14:50

ET2192

Abstract: This paper investigates frequency-domain Global Navigation Satellite System (GNSS) anti-jamming for cooperative reception with multiple uncrewed aerial vehicles (UAVs) under inter-node phase mismatch. A low-complexity phase-calibrated minimum variance distortionless response (MVDR) framework is proposed to avoid repeated adaptive weight recalculation in dynamic processing windows. The method first exploits a dominant non-Gaussian jammer as an opportunistic calibration source. Dual-frequency fourth-order cumulant (FOC) trace ratios are used to estimate the jammer direction and initialize the reference-normalized diagonal phase-error matrix. Static subband MVDR weights are then designed from the calibrated initialization snapshots. During online operation, the static weights are reused, while a least-mean-square (LMS) phase tracker updates only the residual diagonal phase compensation. Thus, the online adaptation is reduced from high-dimensional covariance-based MVDR recalculation to low-dimensional inter-node phase tracking. Simulations show that, under dynamic phase mismatch, the proposed method achieves an average output carrier-to-noise density ratio (C/N₀) of 59.64 dB-Hz, only 0.10 dB below oracle phase tracking. Compared with the per-window power inversion (PI) and uncalibrated MVDR baselines, it improves the average output C/N₀ by 9.04 dB and 7.58 dB, respectively, while reducing the online adaptive-update complexity by 96.1%.

14:50-15:05

ET1051

Paper Title: A UAV-Based Waste Monitoring System with GIS Hotspot Analysis and Online Patrol Optimization

Author(s): Haotian Luo, Muhammad Fahad Khan, Ching Seong Tan

Presenter: Haotian Luo, University of Nottingham Ningbo, China

Abstract: This paper presents a UAV-based waste monitoring and decision-support prototype that integrates flight-log processing, AI-assisted waste detection, GIS



hotspot analysis, and adaptive patrol planning. The system converts UAV observations into geo-referenced waste evidence and stores the results for route history review, hotspot inspection, data upload, and optimization-oriented analysis. The main methodological contribution is a cold-start online-learning patrol framework. At the beginning of the simulation, the route planner does not know the hidden litter probability map. It starts from a blank road-edge risk map and updates patrol priorities from detected, pending, and final-missed events. Candidate patrol routes are generated as feasible closed-loop sorties subject to a maximum flight-time constraint and a return-to-base requirement. Simulation results show that online learning reduces the final missed garbage rate from 2.73 % to 0.60 %, while the two-UAV setting further reduces detection delay and missed events compared with a one-UAV patrol. The proposed framework demonstrates how UAV sensing, AI perception, GIS visualization, and adaptive route optimization can be connected into a practical environmental monitoring workflow.

Paper Title: Intelligent Secure Transmission for Multi-UAV-Assisted Maritime Communications

Author(s): Juncun Su, Helin Yang, Ziling Shao, Liyuan Xie, Chenxi Zhang

Presenter: Chenxi Zhang, Xiamen University, China

15:05-15:20
ET3348

Abstract: Unmanned aerial vehicle (UAV)-assisted maritime links are vulnerable to malicious jamming and passive eavesdropping. We consider a coastal base station serving a maritime user through multiple UAV relays in the presence of both threats. The joint UAV trajectory and anti-jamming problem is formulated as a finite-horizon Markov decision process that maximizes the long-term secrecy rate subject to a quality-of-service requirement. To solve the resulting high-dimensional discrete problem, we propose a Dueling Double Deep Q-Network-based reliable and secure transmission (D3QN-RST) scheme. It combines dueling value estimation, Double Q-learning, and an explicit dynamic jammer response. Simulations under different jammer powers, relay powers, and eavesdropper locations show that D3QN-RST consistently outperforms representative baselines.

15:20-15:35
ET4429

Paper Title: Network Operation and Maintenance Based on Low-Altitude UAVs: Challenges, Architectures and Applications

Author(s): Zhongqiu Xiang, Lei Guo, Qiang Wang, Haoran Zhao, Xuecheng Liu, Anxin Chen, Cheng Li, Linshan Yang, Qihao Liu, Zongkai Liu

Presenter: Lei Guo, China Mobile Group Design Institute Co., Ltd., China

Abstract: Traditional network operation and maintenance (O&M) relies heavily on manual inspection, resulting in high workload and low efficiency. With the continuous development of low-altitude networks, UAV-assisted inspection has emerged as a promising approach to network O&M. However, a unified workflow and technical system are still lacking, with challenges remaining in work order conversion, UAV inspection route planning, and intelligent analysis of inspection



data. To address these challenges, this paper proposes an integrated framework for low-altitude UAV-assisted network O&M, enabling a workflow from maintenance requirements to UAV inspection and subsequent maintenance actions. A semantic-driven method based on large language models and retrieval-augmented generation is developed to automatically convert O&M work orders into executable flight control tasks. Moreover, geographic environment, flight altitude, and low-altitude network quality are jointly considered for inspection route planning, while YOLO-based analysis is employed for automated hazard detection. Experimental results demonstrate that the proposed framework significantly improves end-to-end O&M efficiency over 300% and achieves over 90% accuracy in hazard detection, demonstrating its effectiveness for automated and intelligent network O&M.

TECHNICAL SESSIONS >>>

TS02: Optical Communications and Networks & RF/Microwave Circuits (I)

Session Chair: Suzhi Bi, Shenzhen University, China

Time 13:30-15:25 | Oct. 17, 2026

Venue Meeting Room 2

INVITED TALK | 13:30-13:50

Quantization-Aware Equalization for High-Speed IM/DD Optical Interconnects

Zhaopeng Xu, Pengcheng Laboratory, China



Abstract: High-speed IM/DD optical interconnects increasingly rely on linear/nonlinear equalizers whose practical deployment is often limited by high parameter precision and hardware complexity. In this invited talk, we will first review existing quantization approaches for efficient equalization in high-speed IM/DD systems. We will then present a series of our recently proposed novel quantization methods and their applications, including clustering- and density-aware non-uniform quantization schemes for linear FFE and advanced nonlinear equalizers. These approaches enable substantial reductions in storage and implementation complexity of IM/DD receivers while maintaining reliable system performance.

INVITED TALK | 13:50-14:10

Electro-Optic Comb Enabling Next-Generation Multi-Functional Radio-over-Fiber Fronthaul

Chenbo Zhang, Peking University, China



Abstract: To meet the rigorous demands for capacity, signal fidelity, precise synchronization, and energy efficiency in 6G radio-over-fiber fronthaul networks, we propose a multifunctional architecture enabled by electro-optic (EO) frequency combs. We report five major breakthroughs: (1) a clone-comb self-homodyne scheme compatible with ultra-high-order modulation formats, (2) a record-setting 0.879 Pb/s capability, (3) sub-picosecond timing synchronization, (4) an ultra-simplified baud-rate-sampling coherent detection scheme reducing DSP power consumption by over 50%, and (5) a highly sensitive integrated sensing and communication (ISAC) implementation. Our works highlight EO-comb technology as a compelling foundation for future multifunctional 6G fronthaul networks.

TALK DETAILS

Time	Presentation
14:10-14:25 ET3288	Paper Title: ENACT: LLMs for Encrypted Network Traffic Classification
	Author(s): Xiaoyu Jiang, Chuanting Zhang, Wei Wang, Fangjun Li, Liang Zhang, Basem Shihada, Jingping Qiao
	Presenter: Yuhang Li, Shandong Normal University, China



Abstract: Next-generation wireless networks are expected to provide low-latency and high-throughput services by integrating artificial intelligence (AI) into network management and optimization. Accurate wireless traffic prediction is a key enabler for proactive resource allocation, including bandwidth scheduling and computing capacity provisioning, thereby mitigating network congestion and improving quality of service (QoS). Existing methods mainly rely on deep learning or reinforcement learning to capture spatiotemporal correlations in traffic data. However, such correlation-driven modeling may fail to reveal the underlying causal factors of traffic dynamics, which limits prediction accuracy and generalization capability under complex and non-stationary network conditions. To address this challenge, we propose Causal-GPT, a wireless traffic prediction framework that integrates self-supervised spatiotemporal causal discovery with a large language model. Specifically, a Granger causality-based discovery module is designed to construct causal graphs among traffic variables from observational data, uncovering latent spatiotemporal causal dependencies. The learned causal structure is further incorporated into a pre-trained language model through a causality-enhanced token interaction mechanism, enabling causal-aware traffic representation and prediction. Extensive experiments on two real-world wireless traffic datasets show that Causal-GPT consistently outperforms representative baseline models in prediction accuracy, demonstrating the effectiveness of combining causal modeling with large language models for wireless traffic prediction."

**14:25-14:40
ET1090**

Paper Title: Expectation Maximization-Based Anti-Interference Digital Signal Processing in Phase Sensitive Integrated Sensing and Communication Systems

Author(s): Shuai Liu, Yangfan Xu, Xinwei Du

Presenter: Shuai Liu, The Hong Kong Polytechnic University, China

Abstract: In this work, by applying the expectation maximization (EM)-based scheme, the system performance of polarization-division multiplexing (PDM) communication under fiber nonlinear interference and external vibration through phase-sensitive optical time-domain reflectometry (Φ -OTDR) sensing is investigated. The BER results with varied sensing peak power are presented to reveal the impact of nonlinear distortion through cross-phase modulation (XPM) on PDM signals with the existence of vibration-induced phase shift. By utilizing fewer pilots, the proposed scheme realized high efficiency with robustness against the ultra-fast rotation of states of polarization (RSOP) with sensing-induced disturbances, which is considerable in improving the system performance in practical integrated sensing and communication optical fiber systems.

**14:40-14:55
ET3271**

Paper Title: An Optical Network Management Method for LEO Satellite Internet Based on Domain Autonomy

Author(s): Kai Han, Marie Siew, Lei Cheng, Tony Q. S. Quek, Wenbin Gong

Presenter: Kai Han, Anhui University, China



Abstract: Low Earth Orbit (LEO) satellite Internet faces severe challenges in autonomous network management due to space radiation, laser link instability, and uneven traffic distribution. Traditional centralized or orbit-plane-based domain partition schemes suffer from slow topology convergence, excessive signaling overhead, and inflexible domain-scale control. To address these issues, this paper proposes a novel optical network management architecture based on IntraDomain Autonomy + Inter-Domain Collaboration for mega-LEO constellations. We formulate the domain partition as a multiobjective optimization problem that jointly maximizes domain robustness, accelerates topology convergence, and minimizes signaling overhead, subject to connectivity and diameter constraints. A Coalitional Switching and Adaptive domain-scale Control (CSAC-N) algorithm is developed based on coalition game theory, which supports customizable domain diameters without specifying the number of domains. Simulation results for China's GW constellation show that the proposed scheme outperforms state-of-the-art baselines, achieving 9.67% faster topology convergence and 14.28% lower signaling overhead while maintaining balanced domain scale and robustness.

Paper Title: MIMO-Aided UOWC System for Log-Normal Turbulence Channels

Author(s): Haobo Sun, Wenjun Chen, Ming Jiang, Rui Jiang

Presenter: Ming Jiang, Sun Yat-sen University, China

**14:55-15:10
ET3383**

Abstract: The underwater optical wireless communication (UOWC) technology has emerged as a promising solution to broadband wireless data services. However, the inherent turbulence-induced fading effect in the complex underwater environment imposes a severe impact on the achievable link performance of UOWC systems. To resolve this issue, we propose to incorporate a multiple-input multiple-output (MIMO) technique based on the minimum mean square error (MMSE) metric to tackle the turbulence effect in UOWC scenarios. The proposed system exploits a specific MIMO precoder and an equalizer, which are jointly optimized for oceanic turbulence mitigation. Simulation results show that the new system can achieve a better link reliability than existing schemes in underwater environments with turbulence.

Paper Title: Design of Wide Stopband Waveguide Filter Based on Orthogonal Feeding and Cross-Coupling Structure

Author(s): Zhenxiong Qian, Linlin Sun, Ran Chu, Jia Liao

Presenter: Zhenxiong Qian, Nanjing University of Science and Technology, China

**15:10-15:25
ET1068**

Abstract: Aiming at spectrum pollution caused by insufficient suppression of high-frequency harmonic crosstalk and spurious passbands in microwave communication systems, this paper focuses on the multi-dimensional collaborative design mechanism of wide-stopband waveguide filters, and systematically



investigates core technologies for wide-stopband regulation and spurious passband elimination. An electromagnetic field-circuit hybrid model of the waveguide orthogonal feeding structure is established, and joint analysis is conducted on resonant modes of the main resonant cavity as well as front and rear cavities. The suppression mechanism of orthogonal feeding structure against resonant modes within 15–18 GHz is revealed. On this basis, inductive coupling of cross-coupling network with CT topology is further constructed to realize phase compensation of high-order coupling paths, accurately eliminate spurious passband responses induced by orthogonal feeding, and effectively improve stopband rejection. Fabrication and experimental measurements verify that the designed filter operates at a center frequency of 10 GHz with a bandwidth of 500 MHz. The stopband rejection adjacent to the passband exceeds 40 dB, and the overall rejection within 20 GHz is lower than -17 dB, achieving superior frequency selectivity and wide-stopband performance.



TECHNICAL SESSIONS >>>

TS03: Signal Processing for Communications (I)

Session Chair: Wei Wang, Zhejiang University, China

Time 13:30-15:55 | Oct. 17, 2026

Venue Meeting Room 3

INVITED TALK | 13:30-13:50

Multipath Combining Based Time-Frequency Synchronization Algorithm for LEO Satellite Communications

Si-Yu Zhang, Beijing Information Science and Technology University, China



Abstract: To mitigate the impairments caused by timing offset (TO) and carrier frequency offset (CFO) in low earth orbit (LEO) satellite communication networks, a multipath combining based time-frequency synchronization (MCTFS) algorithm for orthogonal time sequence multiplexing (OTSM) is proposed. For time synchronization, a two stage scheme utilizing multipath combining is developed. After coarse estimation, by exploiting the structure of pilots, a transition detection is utilized to achieve a fine estimation on timing positions. For frequency synchronization, a method based on a two-dimensional correlation is employed, where CFO is estimated via phase extraction from correlation results of the pilots. Simulation results demonstrate that the proposed MCTFS algorithm achieves accurate TO and CFO estimation with favorable bit error rate (BER) in satelliteto-ground communication scenarios.

INVITED TALK | 13:50-14:10

RIS-Aided Radar for Target Detection: Performance Analysis and Joint Active-Passive Design

Zhuang Xie, National University of Defense Technology, China



Abstract: Reconfigurable Intelligent Surface (RIS) brings a transformative potential to radar systems by providing a new dimension to control electromagnetic waves. This lecture focuses on target detectability enhancement through the design and analysis of RIS-aided radar. A comprehensive signal model is established, recognizing both Line of Sight (LoS) and Non-Line of Sight (N-LoS) returns, factoring in RIS location and range gate shifts. This modeling enables an examination of the RIS-dependent effect of enlarged clutter region, underscoring the essential need for precise RIS phase optimization. A joint design problem encompassing transmit waveform, receive filter, and RIS phase is then formulated with the aim to optimize Signal-to-Interference-plus-Noise-Ratio (SINR), complying with practical waveform constraints and discrete RIS phase alphabet. For this nonconvex problem, an iterative algorithm is developed to monotonically enhance SINR, ensuring convergence by alternately updating the radar waveform and RIS phases. Through the majorization-minimization framework, radar waveform updates are achieved using the feasible point pursuit technique, while a quasi-closed form solution is employed for the RIS phases. Simulation results



demonstrate the efficacy of the proposed design, revealing the crucial role of RIS in the system.

TALK DETAILS

Time	Presentation
14:10-14:25 ET2215	Paper Title: DWT-Based Deep Multi-Channel Attentive Network for RFF Extraction and Recognition Author(s): Jiayi Song, Jianing Zhao, Changjian Song, Xinming Zhao, Chen Wang, Zhenjia Gao, Ziyue Wang, Lingyu Xia Presenter: Jiayi Song, Southeast University, China Abstract: Radio frequency fingerprinting (RFF) has emerged as a promising physical-layer technique for device identification and wireless security. However, in practical scenarios, the discriminability of RF fingerprints is often degraded by temporal variation and channel influence. To address these issues, this paper proposes a discrete wavelet transform (DWT)-based multi-channel attentive network for RFF identification in 5G NR systems. First, selected frequency-domain DMRS components are converted to the logarithmic scale and decomposed by a four-level Haar DWT to obtain multiscale subband representations. Then the resulting subbands are organized as multi-channel feature maps and fed into a ResNet-based network with squeeze-and-excitation (SE) attention. Experiments are conducted on a dataset collected from commercial 5G NR modules under both intra-session and cross-session conditions. The results show that the proposed method achieves robust and stable identification performance across different classification scales, and maintains high accuracy in large-scale cross-session module identification, indicating strong robustness to temporal variation and good generalization across acquisition sessions.
14:25-14:40 ET2153	Paper Title: Sparse Fourier Series-Based Evolutionary Optimization for Driving Signal Design in SBS Mitigation Author(s): Kangli Zhu, Mingqian Liu Presenter: Kangli Zhu, Xidian University, China Abstract: Stimulated Brillouin scattering (SBS) limits power scaling in narrow-linewidth fiber amplifiers. We propose a sparseFourier waveform-design method based on the covariance matrix adaptation evolution strategy (CMA-ES). Multi-tone electrical drives are parameterized by a few Fourier amplitudes, while bisection scaling ensures equal energy bandwidth for fair comparison. A two-stage valuation first minimizes peak effective Brillouin gain with spectral-shape penalties, then validates elite candidates through full spatiotemporal SBS simulations. Results show stable CMA-ES convergence and broader, flatter spectra than WNS and PRBS modulation, demonstrating an efficient, physically grounded approach to high-threshold phasemodulation waveform design.



**14:40-14:55
ET1103**

Paper Title: Multi-Channel Spectrum Prediction Based Adaptive Graph Structure and Attention Mechanism

Author(s): Yingchang Ma, Mingqian Liu, Liyuqing Wan, Junhao Guo

Presenter: Mingqian Liu, Xidian University, China

Abstract: To address the problems of insufficient time frequency feature extraction and the difficulty of fixed graph structures in characterizing dynamic channel correlations in multi-channel spectrum prediction under complex and dynamic spectrum environments, this paper proposes a multichannel multi-step spectrum prediction method based on adaptive graph learning and temporal pattern attention, named AdapA-GCBiLSTM. The proposed method first constructs dynamic correlations among channels through an adaptive graph learning module and extracts frequency-domain correlation features of multiple channels using a graph convolutional network. Then, a bidirectional long short-term memory network and temporal pattern attention mechanism are combined to model the temporal dependencies in spectrum sequences. Experimental results show that, compared with LSTM, CNN-LSTM, and GCN-LSTM, the proposed method achieves better performance in terms of prediction accuracy and robustness.

**14:55-15:10
ET4460**

Paper Title: Solver-Consistency-Gated PI-CG Beamforming for Finite-Snapshot Arrays

Author(s): Hang Lin, Jinkun Zhu, Wei Liu, Jing Lei

Presenter: Hang Lin, National University of Defense Technology, China

Abstract: Power-Inversion (PI) beamforming is widely used for adaptive interference suppression because it can form spatial nulls toward jammers by minimizing the array output power without requiring an accurate desired-signal steering vector. In large-scale arrays with finite snapshots, however, block-wise estimates of the PI statistics are subject to significant sample fluctuations. Reusing adjacent data blocks can improve estimation stability, but unconditional reuse may introduce outdated interference information when the spatial state changes. To address this memory-reuse problem, this paper proposes a solver-consistency-gated Power-Inversion Conjugate Gradient (PI-CG) method. The previous trusted PI solution is evaluated against the current finite-snapshot PI optimality condition, and a low-dimensional variance-normalized solver-consistency statistic is constructed to assess whether the previous state remains reliable. This statistic is combined with an output-domain metric to control a three-state REUSE/HOLD/RESET mechanism, which reuses trusted statistics under continuous interference conditions, preserves the trusted state under transient reference-branch observation corruption, and resets the memory and CG initialization under persistent spatial-state changes. Monte Carlo simulations in finite-snapshot dynamic multi-jammer scenarios show that the proposed method maintains comparable typical SINR performance while providing improved lower-tail



robustness. Compared with block-wise processing, unconditional memory reuse, and output-only gating, it substantially reduces the probability of severe SINR degradation while maintaining an overall computational workload close to that of block CG-zero. The results indicate that solver-domain consistency provides useful complementary information for reliable statistical memory and CG warm-start reuse in dynamic PI beamforming.

Paper Title: Delay-Domain Interference-Aware CSI-RS Multiplexing for Overhead Reduction in 5G NR

Author(s): Yuan Zhong, Yijia Li, Yue Xiao, Gang Wu, Vladimir Poulkov, Ming Xiao

Presenter: Yuan Zhong, University of Electronic Science and Technology of China, China

15:10-15:25
ET3385

Abstract: Advanced codebook-based precoding schemes in wideband frequency division duplex (FDD) massive multiple-input multiple-output (MIMO) systems often rely on user-specific channel state information reference signals (CSI-RS) to improve beam alignment and precoding accuracy. However, such designs inherently limit pilot sharing across users, leading to rapidly increasing overhead as the number of served user equipments (UEs) grows. To address this issue, we propose a delay-domain interference-aware CSI-RS multiplexing framework that enables efficient pilot sharing with limited performance loss. The key idea is to exploit the angle-delay sparsity of wideband channels to transform inter-user interference into a delay-domain separable structure, thereby facilitating reliable multiplexing. Specifically, a correlation matrix distance (CMD)-based UE pairing strategy is first developed to select low-correlation user pairs. Then, a base station (BS)-side delay-domain multiplexing scheme is designed to construct shared CSI-RS precoding matrices with controlled delay shifts, while a UE-side interference cancellation method is developed by combining delay compensation and delay-domain interference filtering. Simulation results demonstrate that the proposed scheme can significantly reduce CSI-RS overhead while maintaining favorable spectral efficiency performance.

Paper Title: Movable Antenna-Assisted Covert Communication with Transmitter-Side Random Interference

Author(s): Xing Zhang, Junlin Zhang, Yingchang Ma, Jin Li, Mingqian Liu, Zhisong Hao, Hai Tian

Presenter: Junlin Zhang, Xidian University, China

15:25-15:40
ET2246

Abstract: Covert communication conceals the transmission itself, thereby enhancing wireless security. Existing works mostly rely on externally generated artificial noise, while transmitter-side random interference remains underexplored. This paper proposes a covert communication system in which the transmitter (Alice) employs a two-dimensional movable antenna array to simultaneously transmit the signal and interference beams with symbol-level random power. The



random interference enlarges the overlap between the received power distributions at the warden (Willie) under the transmission and no-transmission hypotheses, thereby improving the covertness. We formulate a joint optimization problem to maximize the covert rate by jointly optimizing the beamforming vectors, the power allocation, and the antenna positions, subject to covertness and power constraints. To address the non-convexity, we develop an alternating optimization algorithm that decomposes the original problem into tractable subproblems and solves them iteratively. Numerical results demonstrate that the proposed scheme significantly improves the covert performance compared with conventional fixed-antenna systems and schemes without transmitter-side random interference, highlighting the effectiveness of movable antennas and transmitter-side interference generation.

Paper Title: Message-Dropout Resilient Asynchronous Decentralized ADMM for Consensus Optimization

Author(s): Jeannie He, Ming Xiao, Mikael Skoglund, H. Vincent Poor

Presenter: Jeannie He, KTH Royal Institute of Technology, Sweden

**15:40-15:55
ET1052**

Abstract: As distributed algorithms face increasing demands, the Alternating Direction Method of Multipliers (ADMM) has gained research focus due to its simplicity, proven convergence properties, and applicability to distributed problems. While recent studies address communication costs, stragglers, and robustness, the critical issue of message dropouts - and the resulting data inconsistency - remains unexplored. Since message dropouts are inevitable in wireless networks, we propose a robust asynchronous decentralized ADMM algorithm to ensure efficiency while maintaining resilience against stragglers and message dropouts. Through theoretical analysis, we confirm our algorithm's convergence properties. Through numerical simulations, we demonstrate that our algorithm significantly outperforms state-of-the-art ADMM variants in both speed and reliability under message loss conditions.

TECHNICAL SESSIONS >>>

TS04: Communication QoS, Reliability & Modeling

Session Chair: Ding Shi, Purple Mountain Laboratories, China

Time 13:30-15:50 | Oct. 17, 2026

Venue Meeting Room 4

INVITED TALK | 13:30-13:50

SmartSail: QoS-Aware AI-RAN Handover Modeling for Reliable TN-NTN Integration

Feng Wang, University of Electronic Science and Technology of China, China

Abstract: The integration of terrestrial networks (TN) and non-terrestrial networks (NTN) is emerging as a key enabler for reliable and ubiquitous 6G connectivity. However, due to the fundamentally different propagation characteristics and temporal variations of terrestrial and satellite links, maintaining stable communication quality across TN-NTN coverage becomes challenging. In particular, frequent signal fluctuations may trigger unnecessary handovers (HOs), ping-pong effects, and service-rate instability, thereby degrading QoS continuity and communication reliability. To address these issues, this paper investigates QoS-aware handover modeling and reliable mobility control for integrated TN-NTN networks under an AI-RAN framework. We first characterize heterogeneous TN and NTN links through link-budget, SINR, and achievable-rate modeling, and then formulate the TN-NTN handover process as a Markov decision process that jointly considers service rate and HO cost. A proximal policy optimization (PPO)-based deep reinforcement learning model is trained and deployed at the unified controller to learn link-quality evolution and proactively determine both HO trigger timing and target segment selection. Extensive simulations with a practical LEO constellation show that the proposed PPO-HO strategy significantly reduces unnecessary and ping-pong HOs while maintaining stable service rates, validating its effectiveness in improving QoS continuity and reliable TN-NTN integration.



INVITED TALK | 13:50-14:10

MASR: Multi-Station foF2 Data Gap-Filling Algorithm for Ionospheric Background Field Reconstruction

Shengyu Zhang, Singapore University of Technology and Design, Singapore

Abstract: Accurate reconstruction of the background ionosphere is essential for ionospheric propagation modeling and meteor burst communications. However, structured data gaps caused by station outages and operational interruptions severely reduce the continuity of foF2 observations, while existing methods often lack robustness to heterogeneous missingness patterns. This paper proposes a Multivariate Adaptive Structured Reconstruction (MASR) framework for foF2 gap filling. Firstly, a multivariate decomposition is performed to separate the slowly





varying climatological background from short term ionospheric variability, thereby reformulating the reconstruction task as a low variance residual estimation problem. A missingness aware routing strategy adaptively combines linear interpolation with a structured residual model. The residual model integrates climatological, temporal, cross station, and learned information, with uniform prior regularization enhancing robustness under severe data loss. In addition, synchronized hmF2 observations are further incorporated as auxiliary variables to improve reconstruction accuracy. Experiments on real ionosonde data under four representative missingness scenarios demonstrate that MASR achieves clear advantages in challenging cases, particularly complete station outages and prolonged data interruptions, while interpolation remains effective when local observations are available.

INVITED TALK | 14:10-14:30

Connectivity Should Not Be Sacrificed: Max-Min Fair Connectivity Management for NTN

Peng Wang, Singapore University of Technology and Design, Singapore



Abstract: Low-Earth-orbit (LEO) Non-Terrestrial Networks (NTNs), enabled by highly mobile satellites, provide global connectivity by dynamically associating User Equipment (UE) with moving satellites. Existing UE-satellite association schemes typically make user-by-user or slot-by-slot decisions while prioritizing service continuity, link quality, or handover reduction. However, when satellite connectivity resources are limited or user demand is high, maintaining continuous connectivity for some UEs may come at the expense of others, leading to severe unfairness. This issue stems from a structural asymmetry between fairness and continuity objectives: once a continuity-oriented association schedule is fixed, the fairness of UEs in terms of the number of served slots is difficult to improve; in contrast, after a fair association is established, the associations can still be reshaped to improve service continuity without sacrificing fairness. To address this problem, we propose FairCoMS, a Max-Min Fair Connectivity Management Scheme for LEO NTNs. FairCoMS first constructs a generalized bipartite graph to jointly model UE-satellite association opportunities, satellite serving capacities, UE connectivity demands, and UE association constraints. Based on this graph, FairCoMS develops a binarysearch-based maximum-flow algorithm to maximize the minimum number of served slots across all UEs, and is proven to achieve max-min fairness. FairCoMS further performs fairnesspreserving association swaps among UEs to reduce handovers while maintaining the achieved fairness. Evaluations under a realistic 1,584-satellite Starlink constellation show that FairCoMS improves the minimum number of served slots by up to $2.3\times$ over the best-performing baseline. Its handover-reduction strategy further reduces the number of handovers by 18%, making the resulting handover performance comparable to existing continuityoriented baselines.

INVITED TALK | 14:30-14:50



Active RIS-Assisted ISAC Systems with Adaptive Reconfiguration against Overtaking-Induced Dynamic Blockage

Ke Zhang, University of Electronic Science and Technology of China, China

Abstract: Integrated sensing and communication (ISAC) in vehicular networks suffers from a series of shadowing events (SSEs) caused by dynamic blockages crossing the line-of-sight link between the roadside unit and the target vehicle. Active reconfigurable intelligent surfaces (RISs) can establish virtual links to maintain connectivity, while demanding timely vehicle tracking and reconfiguration. Furthermore, existing RIS-assisted ISAC schemes typically employ rigid, high-frequency beam reconfiguration, incurring massive control overhead and consuming communication resources for continuous sensing. Conversely, inadequate sensing inevitably induces tracking errors. To address these challenges, this paper proposes an RIS-assisted ISAC system with an adaptive reconfiguration frequency to combat mobile blockage in overtaking scenarios. An Extended Kalman Filter (EKF) is leveraged to track the blocked target. To maximize the long-term average spectral efficiency, we formulate a joint spatial-temporal optimization problem to maximize the the long term average spectral efficiency of a vehicular user. Given the highly nonconvex and mixed discrete-continuous nature of the optimization variables, a Hierarchical Decoupled Proximal Policy Optimization (HD-PPO) algorithm is developed to jointly optimize the adaptive reconfiguration frequency, RSU beam forming, and active RIS reflection matrices. Simulation results demonstrate that the proposed scheme significantly outperforms conventional fixed-interval and RIS-free baselines, effectively maintaining robust communication during severe blockages.



TALK DETAILS

Time	Presentation
14:50-15:05 ET2136	Paper Title: I/P-Aware Delay-Constrained Resource Provisioning for PDU-Set-Based XR Traffic Author(s): Guoli Tu, Yuan Zhang Presenter: Guoli Tu, Southeast University, China
	Abstract: Extended Reality (XR) services require delay-reliable resource provisioning because rare deadline violations may degrade immersive user experience. This paper studies I/P-aware resource provisioning for protocol data unit (PDU)-set-based XR traffic under delay violation probability (DVP) constraints. The proposed model distinguishes the intra-coded (I) part and predictive-coded (P) part of each frame-level XR PDU, assigns separate DVP targets to them, and captures their predictive dependency and differentiated importance through a PDU-set-level utility constraint. A moment-generating-function (MGF)-based stochastic network calculus (SNC) characterization is used to convert stochastic XR arrivals and DVP constraints into service-rate requirements. Based on this characterization, we formulate a subcarrier provisioning problem and solve it by a utility-pruned bisection search (UPBS) method. Simulation results show that the proposed I/P-aware provisioning reduces subcarrier requirements compared with



aggregate and fixed-DVP baselines, while queue-level simulations support the analytical delay results.

Paper Title: Energy-Efficient and Reliable UAV Communications via Resilient RSU Deployment

Author(s): Hao Li, Qing Wei

Presenter: Hao Li, North China University of Technology, China

15:05-15:20
ET3424

Abstract: This paper studies energy-efficient and reliable downlink communications from multi-antenna roadside units (RSUs) uniformly deployed along a straight road to a low-altitude unmanned aerial vehicle (UAV), while evaluating the post-design resilience of the resulting deployment. Under probabilistic line-of-sight (LoS)/non-line-of-sight (NLoS) multiple-input multiple-output (MIMO) fading and frequency reuse, we minimize the total RSU energy consumption during one UAV passage by formulating an outage-constrained design that jointly determines the number of deployed RSUs, their transmission power, and the serving-link beamforming vector. The original problem is decomposed into two sub-problems: deployment density decision (P1) and power optimization (P2). For P1, a tail-aware energy surrogate is developed to select promising integer candidates for N . For P2, the minimum feasible transmit power is found by bisection, with the beamforming variables updated in closed form. To address the practical risk of RSU failures, we further consider a failure-aware resilience scenario under one or two RSU failures by retaining the optimized normal-state common power and selecting the nearest active RSU as the new serving RSU. Numerical results reveal a finite energy-optimal deployment that balances link proximity, co-channel interference, and circuit energy consumption, while retaining acceptable coverage after one or two RSU failures.

Paper Title: Joint Training and Inference Scheduling in Wireless Decentralized Federated Learning

Author(s): Zihan Gao, Chunsheng Cheng, Siyuan Zhou, Jing Zhou

Presenter: Zihan Gao, Hohai University, China

15:20-15:35
ET3291

Abstract: Decentralized federated learning (DFL) is an emerging paradigm enabling on-device collaborative AI without a central coordinator for internet of things (IoT). Edge devices within DFL systems face a dual objective: performing realtime inference for service delivery while simultaneously training models to adapt to dynamic data and prevent model drift. This concurrency creates a resource conflict on constrained devices, where competition for computation and wireless communication resources, exacerbated by the lack of coordination, causes high inference latency and model staleness. Consequently, jointly optimizing training and inference scheduling is essential to managing this core trade-off and ensuring the responsiveness and accuracy of edge AI



applications. This work studies the joint training-inference scheduling problem in DFL. We first formulate an optimization model to quantify the trade-offs among model performance and inference latency, and propose a localized model freshness metric tailored for DFL. We develop a hybrid Lyapunov and deep reinforcement learning (DRL) framework where each client, as an independent DRL agent, makes autonomous online decisions from local observations to maximize long-term model performance while minimizing inference latency and model freshness. Extensive simulations show that, compared with heuristic baselines, our approach significantly improves model performance while maintaining low latency and stable freshness, demonstrating its robustness and effectiveness in wireless edge systems.

Paper Title: Feedback-Driven Retransmission Resource Optimization for SLE Multicast

Author(s): Yanli Zhang, Rongtao Xu, Siyuan Chen

Presenter: Yanli Zhang, Beijing Jiaotong University, China

**15:35-15:50
ET3258**

Abstract: SparkLink Low Energy (SLE) multicast communication supports in-vehicle multi-terminal cooperative control. However, heterogeneous link qualities in complex interference environments limit the effectiveness of conventional fixed resource configurations, threshold-based MCS adaptation, and whole-group retransmission in balancing reliability, latency, and resource utilization. To address this issue, this paper proposes a feedback-driven staged resource optimization method for SLE multicast. In the initial transmission stage, a common frequency-point set is first selected based on multi-terminal link-state information, followed by reliability-constrained MCS selection that maximizes the predicted effective throughput over the candidate MCSs. After the initial transmission, ACK/NACK feedback is used to identify the failed terminal subset, for which the frequency-point set and MCS are reconfigured during retransmission. Furthermore, asymmetric BLER thresholds are adopted for the two stages to balance initial-transmission efficiency and retransmission reliability while satisfying the final reliability requirement. Simulation results demonstrate that the proposed method improves effective multicast throughput and reception reliability while reducing transmission latency, with more pronounced performance gains under low-transmit-power conditions.

TECHNICAL SESSIONS >>>

TS05: Integrated Sensing and Communication (III)

Session Chair: Xufang Wang, Fujian Normal University, China

Time 13:30-15:30 | Oct. 17, 2026

Venue Meeting Room 5

INVITED TALK | 13:30-13:50

Lightpath Provisioning in Space-Division-Multiplexed Elastic Optical Networks with Heterogeneous Multi-Fiber and Multicore-Fiber Links

Yongcheng Li, Suzhou University, China

Abstract: This paper considers space-division-multiplexed elastic optical networks (SDM-EONs) comprising heterogeneous multi-fiber (MF) and multicore-fiber (MCF) links and investigates dynamic lightpath provisioning in these networks. The different spatial-resource structures and physical-layer constraints of MF and MCF links introduce new challenges to resource allocation. We formulate lightpath provisioning as a routing, modulation-format, fiber/core, and spectrum assignment (RMFCSA) problem and propose a spectrum-window-plane (SWP)-based heuristic algorithm, termed SWP-DRA-XFA. The algorithm combines distance- and resource-aware (DRA) routing with crosstalk- and fragmentation-aware (XFA) fiber/core selection to account for link-type-dependent resource availability and physical impairments. Simulation results demonstrate that SWP-DRA-XFA achieves the lowest bandwidth blocking probability (BBP) among the evaluated schemes.



INVITED TALK | 13:50-14:10

SNR-Constrained Joint Design for RIS and RHS-Aided THz Integrated Sensing and Communication

Xufang Wang, Fujian Normal University, China

Abstract: This paper investigates a signal-to-noise ratio (SNR)-constrained terahertz (THz) integrated sensing and communication (ISAC) system assisted by a reconfigurable holographic surface (RHS) and a reconfigurable intelligent surface (RIS). The RHS enables large-aperture transmission via amplitude-controlled holographic beamforming, while the RIS establishes a controllable reflected link to mitigate THz blockages, where users are located in its near-field region. We formulate a non-convex problem to maximize the multiuser sum rate under radar SNR, transmit power, RHS amplitude, and RIS unit-modulus constraints. To address this problem, an alternating optimization (AO) framework is proposed, where the sensing constraint is convexified via a conservative SNR lower bound, the RHS amplitude and digital beamformer are optimized via fractional programming, and the RIS phase shifts are updated on the unit-modulus manifold using a Riemannian conjugate gradient method. Simulation results show that the proposed scheme approaches the communication-only upper bound, outperforms conventional phased-array baselines, and reveals the tradeoff between communication and





sensing performance.

INVITED TALK | 14:10-14:30

Integrated Super-Resolution Sensing and Communication for Low-Altitude UAV Swarms

Zhiqiang Xiao, National University of Defense Technology, China



Abstract: The low-altitude economy has been developing rapidly in recent years. As a key enabler of this economy, unmanned aerial vehicle (UAV) swarms impose new requirements on low-altitude communication and sensing. Achieving super-resolution sensing and efficient communication for UAV swarms in complex low-altitude environments is therefore a fundamental challenge. In this talk, we present our recent research results on this problem, focusing on three aspects: wide-area coverage for low-altitude UAV swarms, super-resolution sensing signal design, and sensing-assisted UAV swarm communications.

TALK DETAILS

Time	Presentation
14:30-14:45 ET2149	Paper Title: TS-RBPPO-Based RSMA Design for STAR-RIS-Aided Integrated Sensing and Communication Author(s): Pengyu Wu, Xueyan Cao, Tao Ren Presenter: Pengyu Wu, Inner Mongolia University, China Abstract: With the surging demand for high-mobility services in 6G networks, integrated sensing and communication (ISAC) has become a core technical paradigm for improving the spectrum efficiency and resource utilization. However, the performance trade-off between communication and sensing in multi-user scenarios still persists. To address this problem, this paper considers an ISAC system that leverages simultaneous transmitting and reflecting reconfigurable intelligent surfaces and rate-splitting multiple access (RSMA) to improve communication fairness and sensing accuracy. Then, we formulate an optimization problem that aims to maximize the max-min fairness rate of communication users while minimizing the maximum eigenvalue of the Cram�er-Rao bound matrix. A novel temperature-scaled rollback proximal policy optimization framework is proposed that relies on an expert-based structure to handle the high-dimensional action space and a temperature-scaling factor to regulate the gating network, thereby effectively mitigating interference among multiple users and targets. Simulation results verify that the proposed algorithm, compared with existing benchmark methods, improves overall system performance by at least 28%.
14:45-15:00 ET2198	Paper Title: Transmit Beamforming for Joint Multiuser Communication and Synthetic Aperture Radar Imaging Author(s): Hong Zeng, Haomin Wang, Yan Pan, Yong Li Presenter: Hong Zeng, Beijing University of Posts and Telecommunications, China



Abstract: Joint communication and synthetic aperture radar(JCASAR) imaging is promising for unmanned aerial vehicle (UAV)-based platforms that need to simultaneously provide imaging and communication services. However, the existing integrated-waveform JCASAR schemes are mainly limited to single-antenna architectures and therefore cannot effectively support simultaneous SAR imaging and multiuser communication. To address this issue, this paper develops a multiple-input multiple-output orthogonal frequency division multiplexing (MIMO-OFDM) JCASAR framework and proposes a transmit beamforming design under a total transmit power budget and per-user achievable rate constraints. The transmit beamforming is designed to minimize the Cramér–Rao bound (CRB) of the weighted radar cross section (RCS) coefficients, so as to improve the estimation accuracy of the SAR range profile and hence the imaging fidelity. A penalty-based iterative algorithm is then devised to solve the resulting nonconvex problem. Simulation results show that, compared with the conventional beamforming design, the proposed design achieves a lower imaging CRB under the same per-user communication rate constraints, and improves the SAR image quality by suppressing spurious peaks and mitigating edge blurring.

Paper Title: Deep Reinforcement Learning-Based Adaptive Resource Allocation for N-HARQ-CC Systems

Author(s): Hongling Huang, Pingping Zhang, Jintao Wang, Xu Wang, Yaowen Chen, Zheng Shi, Guanghua Yang

Presenter: Zheng Shi, Jinan University, China

**15:00-15:15
ET3290**

Abstract: Non-orthogonal hybrid automatic repeat request with Chase combining (N-HARQ-CC) enhances transmission reliability while improving resource efficiency by superposing a freshness packet and a reliability packet within each active retransmission round. This paper investigates adaptive resource allocation in a two-packet N-HARQ-CC system by formulating a long-term average throughput (LTAT) maximization problem, subject to the reliability-outage, freshness-outage and normalized cycle-energy constraints. To efficiently solve this problem, we recast it as a Markov decision process and develop a deep reinforcement learning framework based on a soft actor-critic (SAC) policy with Lagrangian penalties. Numerical results compare three continuous-control learning algorithms and evaluate the SAC policy under various cycle-energy budgets and target-rate pairs. The results show that assigning both freshness and reliability packets a target rate of 1.5 bps/Hz achieves the highest LTAT among the evaluated settings.

**15:15-15:30
ET4495**

Paper Title: An Experimental Proof-of-Concept for TDM-Based Resource Allocation in Next-Generation ISAC Systems Using Commercial 5G Platforms

Author(s): Jiaying Ren, Yahia Shabara, Shawn Tsai

Presenter: Shawn Tsai, MediaTek, USA



Abstract: This paper presents a proof-of-concept demonstration of integrated sensing and communication (ISAC) using commercial 5G New Radio (NR) communication and radar hardware. The developed testbed combines a 5G NR base-station emulator and a radar frontend to realize a sensing-capable gNB, with a commercial smartphone serving as the user equipment (UE). A time-division multiplexing (TDM)-ISAC architecture operating over a time-division duplex (TDD) frame structure is considered, where sensing is performed using selected downlink resources. A sparse sensing resource allocation framework is implemented using the existing NR dynamic rate-matching mechanism, providing standards-compliant control of sensing transmissions. Experimental results demonstrate that the proposed sparse sensing resource allocation significantly reduces overhead while maintaining performance.

TECHNICAL SESSIONS >>>

TS06: AI for Communications and Networks (I)

Session Chair: Gaoyang Liu, Huazhong University of Science and Technology, China

Time 13:30-15:40 | Oct. 17, 2026

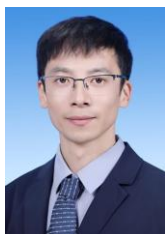
Venue Meeting Room 6

INVITED TALK | 13:30-13:50

Semi-Supervised Transfer Learning for Symbol Detection in Molecular Communications

Yu Huang, Guangzhou University, China

Abstract: Data-driven molecular communication (MC) detectors can avoid explicit channel estimation, but their performance may degrade when the deployment channel differs from the training channel. This paper develops a confidence-guided semi-supervised transfer learning (TL) framework for symbol detection under label-limited target-channel adaptation. A detector is first pretrained on the source channel and then adapted to the target channel using a limited labeled training set. To further exploit unlabeled target observations, confidence-based pseudo-label selection and exponential moving average parameter smoothing are incorporated into the adaptation process. The impact of diffusion-coefficient mismatch is first evaluated by varying the target diffusion coefficient while keeping the other channel parameters fixed. The semi-supervised TL framework is then evaluated under a composite shift in multiple physical channel parameters. Simulation results show that Semi-Supervised TL achieves lower bit error rates than both No Adaptation and Supervised TL across all evaluated labeled adaptation-set sizes, demonstrating the benefit of exploiting unlabeled target observations for label-limited MC channel adaptation.



INVITED TALK | 13:50-14:10

Efficient Multi-Agent Collaborative Decision-Making Mechanisms

Yijing Liu, University of Electronic Science and Technology of China

Abstract: To address the core challenges in multi-agent collaborative decision-making, including policy adaptation difficulties and declining inference efficiency under dynamic environments and growing agent populations, this presentation introduces an efficient collaborative decision-making mechanism that integrates three key modules: fine-tuning and continuous optimization, LLM-guided reinforcement learning (RL) decision-making, and joint inference for agent deployment. Specifically, we first employ compression technologies such as LoRA and pruning to perform lightweight fine-tuning, enabling rapid customization of task-specific policies while preserving the generalization capability of pre-trained knowledge. Then, we introduce a large language model (LLM) as a high-level





semantic guide that transforms environmental observations and sub-goals into natural-language-shaped reward potential functions. This guides the underlying RL policy toward directed exploration in sparse-reward scenarios. Finally, we design a multi-scale joint inference framework that integrates local policies with global information at the decision level via shared attention mechanisms and hierarchical message passing among agents, effectively alleviating communication and computational bottlenecks.

TALK DETAILS

Time	Presentation
14:10-14:25 ET1106	Paper Title: Quantum Graph Neural Networks for Mobile Networks: Use Cases, Opportunities and Challenges Author(s): Chengkang Pan, Yun Zhu, Shuai Hou, Jianjun Liu, Xinying Li, Xin Yi, Xian Lu, Fei Wang, Li Yu Presenter: Chengkang Pan, China Mobile Research Institute, China Abstract: Graph Neural Networks (GNNs) have been widely studied for mobile network operations, while quantum machine learning shows emerging advantages. Quantum Graph Neural Networks (QGNNs) open new opportunities for mobile networks, yet this field remains largely unexplored. This paper summarizes typical computing scenarios and use cases in mobile networks, then systematically reviews existing QGNN models and analyzes their applicability. To address practical needs, we propose a unified three-layer QGNN architecture and provide a design case on quantum graph Hamiltonian learning. We also discuss inherent challenges and outline key directions for future research.
14:25-14:40 ET2203	Paper Title: Cross-Attention Enhanced Dual-Stream Transformer for Resource Orchestration in AI-RAN Author(s): Xinning Wang, Bin Qi, Jinlong Wu, Yi Chi, Yansong Liang, Wensheng Zhang Presenter: Xinning Wang, Shandong University, China Abstract: The emerging artificial intelligence-radio access network (AI-RAN) paradigm co-locates AI workloads and RAN functions on shared computing infrastructure. However, resource orchestration remains a critical challenge, as AI and RAN indicators reside in incommensurable measurement spaces that preclude direct comparison. In this research, we propose a novel Cross-Attention enhanced Dual-Stream Transformer model (CA-DST) that processes the AI and RAN domains independently. This model preserves domain-specific statistical properties and enables cross-domain, bidirectional workload status querying via a cross-attention fusion mechanism, followed by a decision head that maps the fused representations into a binary allocation priority. Experiments conducted on real-world base-station data demonstrate that CA-DST achieves higher accuracy of



resource orchestration. Furthermore, it significantly outperforms existing rule-based, supervised, and deep learning baselines while exhibiting superior cross-site generalization capabilities.

Paper Title: Generative Semantic Communication for Collaborative Perception

Author(s): Shuoyao Wang, Suzhi Bi, Liping Qian

Presenter: Shuoyao Wang, Shenzhen University, China

**14:40-14:55
ET3251**

Abstract: Generative semantic communication (GenSem-Comm) has become a promising paradigm for low-rate wireless image transmission, sending compact semantic conditions and exploiting pretrained generative models at the receiver. Although existing one-to-one (O2O) GenSemComm has made remarkable progress, collaborative perception requires multiple devices to share complementary views over heterogeneous wireless channels. Directly applying O2O GenSemComm to each view can cause redundant semantic transmission. This paper proposes CoGenSC, a multi-view collaborative GenSemComm framework. The core idea is a heterogeneous transmission framework that schedules a dense visual carrier and a compact structural carrier as complementary generation conditions. To determine this heterogeneous schedule with low overhead, a lightweight cross-view scheduler operates on compact semantic embeddings and channel-aware state information, and jointly infers the view-branch priority and compression ratio. At the receiver, the decoded visual, structural, and textual conditions are fused for generative reconstruction. Experiments show that compared to state-of-the-art O2O GenSemComm benchmarks, CoGenSC reduces the communication overhead by about 20% while significantly improving semantic fidelity and perceptual quality, especially under low-SNR and heterogeneous-channel settings.

Paper Title: Sensing-Computation-Communication Co-Optimization for Federated Edge Learning-Enabled Agentic AI

Author(s): Xiaoqian Li, Wenyue Duan, Yijing Liu, Shuang Qin, Yuanai Xie, Xiaoming Yuan

Presenter: Wenyue Duan, University of Electronic Science and Technology of China, China

**14:55-15:10
ET1067**

Abstract: Agentic Artificial Intelligence (Agentic AI) is rapidly emerging as a transformative paradigm for edge intelligence, enabling autonomous sensing and decision-making to form a closed loop of sensing-reasoning-action-learning. Federated Edge Learning (FEEL), which facilitates decentralized data sensing, efficient on-device training, and lightweight collaborative model aggregation, provides a promising foundation to support the autonomous capabilities of distributed Agentic AI agents in edge networks. However, most existing FEEL deployments treat sensing, training, and uploading separately, especially overlooking the critical sensing stage and its inherent coupling with subsequent



training and uploading, thereby constraining FEEL's ability to realize the full autonomous loop required by Agentic AI agents. While recent works acknowledge the importance of joint design, they mainly rely on centralized optimization and control, thus failing to fully exploit the autonomous decision-making capabilities of edge agents. To address these gaps, we propose a joint sensing, computation, and communication (SCC) optimization framework with a decentralized mechanism for FEEL-enabled Agentic AI. In this framework, the global agent provides global guidance based on historical information, while each edge agent autonomously decides whether to participate and optimizes its SCC strategies upon participation. Simulation results demonstrate that the proposed framework outperforms both baselines lacking autonomous decision-making and those without joint SCC optimization.

Paper Title: Investigating Variational Quantum Circuit Design for Hybrid Recurrent Motion Prediction

Author(s): Niussha Sabri Kadijani, Lian Zhao

Presenter: Lian Zhao, Toronto Metropolitan University, Canada

**15:10-15:25
ET3427**

Abstract: Accurate six-degree-of-freedom (6DoF) head-motion prediction is important for efficient immersive virtual reality streaming. However, improving prediction accuracy with conventional recurrent models often requires increased model capacity and parameter count. A parameter-efficient quantum long short-term memory (QLSTM) model is investigated for 6DoF motion prediction, where variational quantum circuits (VQCs) compute the recurrent gate outputs. The approach is evaluated on the NTHU site of the EyeNavGS 6DoF VR navigation dataset using the same input representation and prediction settings as classical baselines. The effect of quantum circuit design is analyzed through controlled ablations of variational depth and CNOT entanglement topology. Results show that a shallow two-layer VQC without entanglement achieves the lowest errors among the evaluated configurations. The resulting QLSTM models achieve lower rotation and position errors than parameter-matched classical baselines while using fewer trainable parameters. In particular, the six-qubit QLSTM reduces the parameter count by 64% compared with the strongest classical baseline (GRU-19) while reducing the rotational tail error from 25.8° to 23.6°. The results demonstrate the potential of compact quantum recurrent models for parameter-efficient 6DoF motion prediction

Paper Title: EV-Assisted Drone Charging: A Fuzzy-AI Based Charging EV Selection Mechanism

Author(s): Aysha Siddika, Thien Wan Au, S. H. Shah Newaz, Fatin Hamadah Rahman

Presenter: Thien Wan Au, Universiti Teknologi Brunei, Brunei

**15:25-15:40
ET3416**

Abstract: This paper proposes a multi-stage trust-aware EV selection method for EV-assisted drone charging. The proposed method identifies reliable and feasible



EV charging resources for drones during delivery missions through sequential availability filtering, trust evaluation, battery-feasibility verification, and destination-progress assessment. A Mamdani Fuzzy Inference System (FIS) estimates EV trust using success rate, availability reliability, and performance quality. Candidate EVs that do not satisfy the trust requirement are excluded before selection, while battery feasibility and destination progress support continuous multi-hop routing. The proposed method is evaluated against three selected approaches: Nearest-EV, Crisp-Trust, and an adapted Fuzzy Trust-based Secure Routing (FTSR)-based trust selection method. Over 100 random-seed scenarios, simulation results demonstrate that the proposed method achieves a 96.0% mission success rate while reducing the average number of charging stops and flight distance to accomplish a mission. Overall, the results demonstrate that integrating fuzzy trust with battery feasibility and destination progress can improve the efficiency and reliability of EV-assisted multi-hop drone charging.



TECHNICAL SESSIONS >>>

TS07: Space-Air-Ground Communication and Space Networking (I)

Session Chair: Cui-Qin Dai, Chongqing University of Posts and Telecommunications, China

Time 13:30-15:35 | Oct. 17, 2026

Venue Meeting Room 7

INVITED TALK | 13:30-13:50

Two-Time-Scale Service Caching and Computation Offloading for SAGIN Networks

Cui-Qin Dai, Chongqing University of Posts and Telecommunications, China

Abstract: Space-air-ground integrated MEC networks can support access, caching, and computing services for Internet of Things (IoT) applications by combining the advantages of satellite coverage and unmanned aerial vehicle (UAV) flexibility. However, the limited UAV cache capacity and the diversity of computationally intensive tasks in IoT devices have led to overload of offloading nodes, which poses a great challenge in task offloading delay and energy costs. In this paper, a two-time-scale joint optimization scheme for service caching and computation offloading is proposed to optimize the average joint cost through dynamic UAV service caching and adaptive cooperative task offloading. Firstly, a SAGIN-MEC model is established with an LEO satellite, multiple UAVs, and IoT devices. Then, the average joint cost is derived by integrating task completion delay and energy consumption to indicate the delay and energy tradeoff. Continually, an optimization problem is formulated to minimize the average joint cost by incorporating an inter-UAV cooperation mechanism. After that, an atom search optimization and multi-head-attention multi-agent proximal policy optimization (ASO-MHA-MAPPO) algorithm is developed to achieve large-time-scale caching update and small-time-scale cooperative offloading and reduce the average joint cost. Simulation results demonstrate that the proposed scheme outperforms benchmarks in terms of average joint cost under diverse network conditions.



TALK DETAILS

Time	Presentation
13:50-14:05 ET1078	Paper Title: Adaptive Reference-Assisted Doppler Positioning with LEO Satellite Signals Author(s): Lijuan Yi, Jinghong Sun, Wenbin Guo Presenter: Lijuan Yi, Beijing University of Posts and Telecommunications, China Abstract: Low Earth orbit (LEO) satellite signals provide strong Doppler measurements for opportunistic positioning. Reference-assisted differential



processing can suppress common-mode errors observed by both user and reference receivers. However, conventional differential Doppler positioning typically assumes stable, high-quality reference measurements. When reference-side noise becomes large, time-varying, or satellite-dependent, this assumption leads to measurement covariance mismatch and can severely degrade positioning robustness. We address this problem by developing an adaptive covariance modeling framework for reference-assisted LEO Doppler positioning. By monitoring the innovation sequence of differential Doppler measurements, the proposed method updates the effective measurement covariance online, mitigating reference-quality mismatch without requiring exact time-varying noise statistics. A non-adaptive fixed quality-aware covariance model is also included to evaluate the value and limitations of using prior reference-quality information. Monte Carlo simulations compare four schemes: no-reference Doppler positioning, conventional differencing, the fixed quality-aware model, and the proposed adaptive method. The results indicate that conventional differencing is effective only when the reference receiver remains clean and stable, whereas the proposed adaptive method provides lower positioning errors and improved robustness under time-varying and localized reference-side degradation conditions.

Paper Title: Performance Analysis of Satellite-Terrestrial Coexistence Networks with Gamma-Distributed Signal and Interference

Author(s): Xuan Liu, Xueyan Cao, Fei Xu

Presenter: Xuan Liu, Inner Mongolia University, China

14:05-14:20
ET2147

Abstract: This paper investigates the performance of satellite-terrestrial coexistence networks, where a desired satellite serves a user terminal in suburban or remote areas while experiencing interference from densely deployed terrestrial access points in urban regions. Both the desired signal and aggregate interference are modeled as Gamma-distributed random variables, effectively capturing small-scale fading and shadowing effects. We derive closed-form analytical expressions for outage probability and ergodic capacity, and provide asymptotic approximations across different signal-to-interference ratio regimes to characterize ergodic capacity behavior in interference-limited scenarios. Monte Carlo simulations are conducted to validate the analytical models and to quantify the influence of key system parameters, including the number of satellite antennas, line-of-sight power, scattering parameter, and fading severity. The results offer practical insights for system design, power allocation, and interference management in satellite-terrestrial coexistence networks.

14:20-14:35
ET2233

Paper Title: Degradation-Aware Battery Pack Management with Adaptive Task Scheduling for Energy-Efficient Operations in LEO Networks

Author(s): Jinjin Tian, Ahmad Y. Alhusenat, Wenqian Xu, Ziqi Liu, Lei Lei

Presenter: Jinjin Tian, Xi'an Jiaotong University, China



Abstract: Next-generation Low Earth Orbit (LEO) satellites require an integration of communication, sensing, and computation capabilities under stringent energy and longevity constraints. This paper proposes an on-board battery optimization framework to enable sustainable satellite operations. The framework manages battery pack systems using discrete binary cell-level assignment for both charging and discharging, maintaining the depth-of-discharge (DoD) below the 25% safety threshold. The framework guarantees queue stability by developing a scheme of Lyapunov-based discrete cell selection. Simulation results demonstrate that the proposed framework achieves 14,707 battery cycles, representing 25.8% to 50.5% improvements over baseline methods. These improvements translate to multiple additional years of next-generation LEO satellite constellations operating under increasingly demanding computational workloads.

Paper Title: Capacity-Aware Detour Routing for Temporary MIMO Feeder Link Degradation in LEO Satellite Networks

Author(s): Ziqi Liu, Yunpeng Zhao, Ahmad Y. Alhusenat, Qizhou Wang, Lei Lei

Presenter: Ahmad Y. Alhusenat, Xi'an Jiaotong University, China

**14:35-14:50
ET3335**

Abstract: In this paper, we consider detour routing in low Earth-orbit (LEO) satellite networks as a mechanism to maintain service continuity under temporary multiple-input multiple-output (MIMO) feeder-link capacity degradation. To enable robust detour satellite selection, we formulate the problem as a constrained multi-attribute decision-making model that jointly accounts for feeder-link quality, storage availability, workload, latency, and energy resources. Analytical conditions are derived to determine the satellite positions at which MIMO capacity degradation occurs, and the probability of simultaneous degradation across neighboring satellites is formally characterized. Building on these results, a fuzzy adaptive capacity-aware TOPSIS for detour routing (FACT-DR) algorithm is proposed, which combines triangular fuzzy numbers with an adaptive weighting mechanism, proven to be monotonically responsive to degradation severity, to rank candidate detour satellites under uncertainty. Simulation results demonstrate that FACT-DR achieves the best overall trade-off among throughput, latency, energy consumption, and reliability, attaining a task success rate of 96% and consistently outperforming benchmark schemes during feeder-link degradation events.

**14:50-15:05
ET4480**

Paper Title: Load-Aware Grant-Free Access for Space-Air-Ground Integrated Networks

Author(s): Wenqiang Li, Jianan Zhu, Xiaoling Hu, Chenxi Liu

Presenter: Chenxi Liu, Beijing University of Posts and Telecommunications, China

Abstract: In this paper, we propose a load-aware grant-free multiple access (GFMA) scheme for space-air-ground integrated networks (SAGINs), in which a low-Earth-



orbit (LEO) satellite provides uplink access to delay-sensitive unmanned aerial vehicles (UAVs) and delay-tolerant terrestrial users (UEs) under partially observable and time-varying contention loads. Specifically, under a short-horizon quasi-static load approximation, we first characterize the dependence of UAV tail-delay risk on the full posterior predictive load distribution and then formulate a risk-constrained access optimization problem. Accordingly, we develop a Bayesian filtering and prediction framework to infer the next-subframe load distribution, enabling joint optimization of class-specific resource block quotas and access probabilities to minimize terrestrial UE access delay, subject to the UAV tail-delay risk constraint. Simulation results show that the proposed scheme satisfies the UAV tail-delay reliability requirement and outperforms other benchmarks, with particularly pronounced gains under heavy loads.

Paper Title: Proactive Resource Management for AI-Agent-Enabled SAGINs: A Contract-Theoretic Mean Field Game Approach

Author(s): Xu Chen, Jiachen Sun, Donglin Guan, Hao Xu, Yi Jing

Presenter: Jiachen Sun, The Hong Kong University of Science and Technology, China

15:05-15:20
ET4506

Abstract: The dense deployment of low Earth orbit (LEO) constellations with on-board computing payloads is turning satellites into ubiquitous edge servers for heterogeneous ground, maritime, and aerial terminals. Increasingly, these terminals host large-language-model-driven AI agents that autonomously adapt their service requests to the perceived network state, rendering resource access patterns highly dynamic and unpredictable. Conventional management is reactive: it adjusts resources only after congestion has been observed, so its response inevitably lags behind these dynamics and congestion cannot be relieved in time. This paper proposes a proactive resource management framework for AI-agent-enabled space--air--ground integrated networks (SAGINs). We model the access decisions of a large population of agents as a finite-state mean field game (MFG) and design a contract-theoretic incentive mechanism between the satellite operator and the agents to enable macro-level regulation. A McKean--Vlasov reformulation eliminates the randomness of the contract, and the Pontryagin maximum principle decouples the problem into forward--backward ordinary differential equations---augmented with a correction term capturing coverage-induced terminal churn---plus an alternating per-slot convex resource allocation step. Simulations under both closed and open systems show that, compared with pure-MFG and static-contract baselines, the proposed scheme improves resource utilization by up to 40%, reduces system cost by up to 25%.

15:20-15:35
ET4498

Paper Title: Contour-Warped NLOS Localization with Urban Electromagnetic Medium Maps

Author(s): Dezhuang Qin, Jiaming Wu, Yan Zhang

Presenter: Jiaming Wu, Beijing Institute of Technology, China



Abstract: Urban electromagnetic environments are increasingly crowded with communication, navigation, and remote-control signals, and unauthorized low-altitude, slow, and small targets, such as unmanned aerial vehicles (UAVs), pose a growing threat to major-event security. Accurately localizing such targets is therefore of critical importance. Most existing localization methods assume line-of-sight (LOS) propagation, which fails under dense urban conditions and severely degrades localization accuracy. In this paper, we propose a contour-warped non-line-of-sight (NLOS) localization algorithm based on urban electromagnetic medium maps. The maps warp the geometric solution space, mitigating NLOS-induced bias without explicit per-path penetration-loss computation. With an offline-online decoupled design, the maps are precomputed by ray tracing, while online localization is performed by matching received signal strength (RSS) measurements against the precomputed maps, confining the online computation to map superposition and matching. Simulation results in a typical urban scene show that, with three monitoring points, the proposed method achieves a mean absolute error of 12.20 m and a root-mean-square error of 14.74 m over 17 transmitter locations, reducing the mean absolute error by over 100 m compared with conventional RSS and time-difference-of-arrival baselines.

TECHNICAL SESSIONS >>>

TS08: Communication and Information Theory (I)

Session Chair: Yao Sun, University of Electronic Science and Technology of China, China

Time 13:30-15:25 | Oct. 17, 2026

Venue Board Room

INVITED TALK | 13:30-13:50

Chaotic Base-Band Wireless Communication

Hai-Peng Ren, National Key Laboratory of Land & Air Based Information Perception & Control, China



Abstract: Chaos has demonstrated special properties like randomness, spread spectrum, which had been explored for spread spectrum application and formed IEEE communication standard IEEE 802.15.6. New properties like Lyapunov spectrum invariance, simplest matched filter induced new trend for chaotic base-band wireless communication system (CBWCS). The talk reviewed the basic concepts in CBWCS, showed theoretical optimal decoding threshold analytically to eliminate the inter-symbol interference. Although, the theoretical optimal decoding threshold is available because of the future information bit needed, the sub-optimal threshold and AI methods can be used to achieve the superior performance in the multipath wireless channel as compared to the conventional method. The future trend is also given for future exploration.

INVITED TALK | 13:50-14:10

High-Reliability and Low-Latency Coding and Decoding Techniques for Massive-Access Networks

Yi Fang, Guangdong University of Technology, China



Abstract: Massive access is a key technology for enabling connectivity among massive numbers of devices in 6G, and supports the development of China's next-generation information infrastructure. However, meeting the demand for efficient and reliable communications in massive-access scenarios remains a highly challenging problem. This talk will focus on massive-access communications, and introduce the protograph-based multi-user coding and decoding techniques. First, for sparse code multiple access (SCMA) systems, we propose interleaved superposition coding and slot-cascaded decoding to achieve efficient and reliable information transmission across time slots. Second, we develop a ranked successive detection and decoding (R-SDD) algorithm, exploiting the reliability differences among users to improve message-passing efficiency. We also introduce early-stopping criteria for message updates to reduce detection and decoding latency. Finally, based on the characteristics of soft information evolution during multi-user detection and decoding, we



propose a new protograph-code construction scheme to enable a joint optimization for transceiver. Compared with existing counterparts, the proposed designs achieve significant advantages in error-correction performance, computational complexity, and general applicability, and thus provide a promising solution for high-reliability and low-latency communications in massive-connectivity scenarios..

TALK DETAILS

Time	Presentation
14:10-14:25 ET1044	Paper Title: Generalized Index Modulation for Pinching Antenna Systems with PEP-Driven Position Optimization Author(s): Qixin Chen, Qiaosheng Xie, Jun Li, Xuan Chen, Qiang Li Presenter: Qixin Chen, Guangzhou University, China Abstract: Pinching antenna systems (PASSs) provide reconfigurable radiating points along dielectric waveguides for highfrequency communications. This paper proposes PA-based generalized space-shift keying (PA-GSSK) and PA-based generalized index modulation (PA-GIM), where information bits are conveyed by the waveguide activation pattern (WAP), antenna activation pattern (AAP), and modulation-symbol pattern (MAP). To exploit PA mobility from an error-probability perspective, a pairwise error probability-driven successive convex approximation (PEPSCA) algorithm is developed to enlarge the received distances of dominant error pairs for multiple users over multiple SNR points. Simulations show that the proposed schemes outperform conventional PA transmission and that PEP-SCA improves WAP/AAP/MAP reliability.
14:25-14:40 ET2150	Paper Title: Boundary Current Transport for Geometry Structured Signaling in Metallic Enclosures: An Electromagnetic Information Theory Model Author(s): Youyang Xiang, Zhuo Zhang, Qilong Du, Nanzhou Hu, Xianglu Li, Chao Zeng, Xianhua Shi, Jie Tian Presenter: Youyang Xiang, Institute of Electronic Engineering, China Academy of Engineering Physics, China Abstract: Metallic cavities in vehicles, aircraft bays, launcher compartments, industrial machines, and shielded cabinets require short-range wireless Internet of Things (IoT) and wireless sensor network (WSN) links under mounting, thermal, mechanical, and electromagnetic compatibility (EMC) constraints. Conducting walls induce boundary currents and cavity-specific fields, so the useful transmit subspace depends on enclosure geometry. This paper develops an electromagnetic information theory (EIT) model for geometry-structured fixed-basis signaling in metallic enclosures. A dominant co-polarized component is derived from the perfect electric conductor (PEC) boundary condition and represented by a panelized scalar boundary current network with



direct, single-bounce, and higher-order scattering terms. The same network gives a communication channel approximation and a transmit-side design Gram matrix for basis construction. Simulations with panel-grid, placement, modal-reference, passivity-margin, and design-weight checks show that boundary-current transport changes the receiver whitened communication subspace. The resulting basis is useful when its design eigenspace aligns more closely with this subspace than universal smooth-aperture bases under the same dimension, power, and disturbance conventions.

**14:40-14:55
ET1072**

Paper Title: Coverage Probability Analysis of 3D Multi-Antenna SCMA-Based Flexible-Load Ultra-Dense Networks

Author(s): Meysam Soltanpour, Muhammad Ayzed Mirza, Daojun Liang, Caifeng Wang, Yuan Liu, Nan Li

Presenter: Meysam Soltanpour, Qilu Institute of Technology, China

Abstract: This work investigates the coverage probability of three-dimensional (3D) multi-antenna sparse code multiple access (SCMA)-based flexible-load ultra-dense networks (FLUDNs). Leveraging stochastic geometry (SG), we derive a novel exact closed-form expression for coverage probability, accounting for the complex interplay between spatial diversity, flexible active loads, multi-user connectivity, and 3D spatial distributions. We demonstrate that the conventional Moment Generating Function (MGF) method and the Plancherel – Parseval theorem converge in the coverage probability formulation when higher-order signal-interference dependencies are considered, a relationship previously unreported in MGF-based UDN analysis. Numerical results validate the analytical framework for multi-antenna SCMA-based FLUDNs, revealing that these configurations significantly outperform single-antenna systems and mitigate coverage degradation under high load conditions. Crucially, spatial diversity emerges as an effective substitute for spectral resources, enabling robust connectivity without strict spectral expansion.

**14:55-15:10
ET3419**

Paper Title: OFMCW: An Orthogonal Chirp-Embedded OFDM Waveform for Integrated Sensing and Communication

Author(s): Yi Wang, Zhizheng Lu, Yu Han, Shi Jin

Presenter: Yi Wang, Southeast University, China

Abstract: his paper develops orthogonal frequency modulated continuous wave (OFMCW), a chirp-embedded multicarrier waveform for integrated sensing and communication (ISAC). Unlike conventional approaches that superimpose separately generated communication and sensing waveforms, OFMCW introduces a common linear chirp phase into a conventional orthogonal frequency division multiplexing (OFDM) symbol. As a result, all subcarriers sweep synchronously over time while their frequency separation remains unchanged. We establish that such common chirp modulation preserves subcarrier orthogonality, thereby enabling an



OFDM-compatible communication architecture. Meanwhile, propagation delay is mapped into a chirp-induced beat-frequency component after dechirping, which provides an additional mechanism for range-Doppler sensing. Based on these properties, we develop a dual-branch transceiver in which the communication branch performs chirp compensation followed by conventional OFDM processing, while the sensing branch performs dechirping and multidimensional parameter estimation. The communication and sensing characteristics of OFMCW are analyzed under the same bandwidth, transmit-power, and observation-duration constraints as conventional OFDM and frequency modulated continuous wave. Numerical results verify that OFMCW retains the multicarrier communication capability of OFDM while enabling chirp-assisted sensing capability within the same waveform structure

Paper Title: A Novel 3D Non-Stationary GBSM for Stairwell Wireless Communication Scenarios

Author(s): Yuqi Bai, Jie Huang, Chen Huang, Cheng-Xiang Wang

Presenter: Yuqi Bai, Southeast University, China

15:10-15:25
ET4501

Abstract: To achieve the vision of sixth-generation (6G) wireless communication systems, accurate channel modeling for diverse emergency scenarios is essential. This paper proposes a three-dimensional (3D) non-stationary multiple-input multiple-output (MIMO) geometry-based stochastic model (GBSM) for stairwell scenarios. The proposed channel model considers the effects of stairwell geometry on path loss, cluster evolution, and intra-cluster distributions. An effective propagation distance path loss model is developed to characterize the attenuation caused by the stairwell structure. Furthermore, platform effect and pedestrian blockage are introduced to describe the dynamic propagation environment. Based on the proposed channel model, channel characteristics, including spatial cross-correlation function (SCCF), angular power spectral density (PSD), and root mean square (RMS) delay spread are derived and analyzed. Results are further compared with those of 3GPP TR 38.901 and 6G pervasive channel model (6GPCM), demonstrating that the proposed channel model can effectively capture the influence of stairwell physical features on channel characteristics.

TECHNICAL SESSIONS >>>

TS09: Mobile, Wireless and Green Communication Networks (I)

Session Chair: Siyu Zhang, Beijing Information Science & Technology University, China

Time 16:00-18:05 | Oct. 17, 2026

Venue Meeting Room 1

INVITED TALK | 16:00-16:20

Freshness Optimization for Secrecy-Aware UAV-Enabled RSMA-ISAC Vehicular Networks

Xinyue Pei, Northeastern University, China

Abstract: This paper investigates freshness-aware resource control for an unmanned aerial vehicle (UAV)-enabled multiuser integrated sensing and communication vehicular network in the presence of a mobile eavesdropper. In this scenario, the UAV first senses the states of moving ground vehicles to refresh network-side state estimates and then securely transmits freshness-critical control updates through rate-splitting multiple access (RSMA)-based downlink transmission. To minimize the long-term weighted average age of information (AoI), we jointly optimize the UAV trajectory, sensing transmission, communication beamforming, and common-rate allocation, while separately modeling the dynamic evolution of sensing AoI and communication AoI. Since the resulting optimization problem is highly non-convex, long-horizon, and strongly time-dependent, we formulate it as a Markov decision process and propose a gated recurrent unit-enhanced proximal policy optimization framework with staged curriculum learning. The proposed framework learns coordinated UAV mobility and RSMA transmission strategies from short-term temporal observations. Numerical results show that, compared with multiple deep reinforcement learning baselines, the proposed method achieves better training convergence, weighted average AoI, and late-stage training stability. In addition, the learned policy exhibits favorable trajectory behavior and environmental adaptability.



TALK DETAILS

Time	Presentation
16:20-16:35 ET2232	Paper Title: Sensing-Assisted Localization and Performance Optimization for Indoor Near-Field UAV-IRS Communication Systems Author(s): Jingqi Yang, Xueyan Cao, Jun Cui Presenter: Jingqi Yang, Inner Mongolia University, China Abstract: Abstract—To overcome severe line-of-sight blockages in indoor near-field systems, this paper proposes a two-phase sensing assisted communication protocol utilizing an unmanned aerial vehicle (UAV) and an intelligent reflecting



surface (IRS). In the initial sensing phase, the target's 3D location is accurately estimated using a fast Fourier transform algorithm under a spherical wavefront propagation model. This is followed by the communication phase, which formulates an optimization problem guided by this localization to maximize the received signal-to-noise ratio (SNR). To solve this non-convex problem, an alternating optimization framework is developed, employing projected gradient ascent for continuous trajectory planning and utilizing a closed-form centroid solution for phase shifts to jointly design the base station active beamforming, UAV trajectory, and IRS phase shifts and drastically reducing computational complexity from $O(NI4.5)$ required by semidefinite relaxation to $O(NBNI)$. Simulations demonstrate a 1.15 cm localization error, rapid convergence, and an 8.9 dB SNR gain over the particle swarm optimization baseline, as well as strong robustness against 2-bit IRS phase quantization. Index Terms—Unmanned aerial vehicle, intelligent reflecting surface, sensing-assisted communication, near-field.

Paper Title: Efficient Probe Selection for Massive MIMO OTA Testing Based on Sparse Bayesian Learning

Author(s): Yushen Wang, Haomin Wang, Chenyi Wang, Wei Hong, Yong Li

Presenter: Yushen Wang, Beijing University of Posts and Telecommunications, China

**16:35-16:50
ET2222**

Abstract: In over-the-air (OTA) testing of massive multiple-input multiple-output (MIMO) devices, the prefaded signal synthesis (PFS) method is widely used in multi-probe anechoic chamber (MPAC) setups due to its flexibility in reconstructing channel spatial characteristics. The cost of channel emulator ports, however, limits the number of probes that can be activated simultaneously. Probe selection is therefore essential for practical MPAC deployment. Existing sparse greedy algorithms are prone to local optima, whereas convex optimization methods incur high computational cost. This paper proposes an efficient probe selection method based on sparse Bayesian learning (SBL) with a non-negative selection criterion derived from marginal likelihood. By assigning sparsity-inducing priors to probe weights, the proposed method uses hyperparameters to control weight variances and probabilistically evaluate the contribution of each probe. A sequential error-correction mechanism with addition, re-estimation, and deletion operations updates these hyperparameters from a marginal-likelihood perspective. This procedure removes redundant probes and reduces the local path dependence of greedy selection. Simulations on complicated multi-cluster channel models show that the proposed algorithm achieves accurate emulation with substantially shorter execution times.

**16:50-17:05
ET1100**

Paper Title: Topology Inference for Non-Cooperative Communication Wireless Networks

Author(s): Yingchang Ma, Mingqian Liu, Yang Li, Junhao Guo



Presenter: Mingqian Liu, Xidian University, China

Abstract: Accurate inference of wireless network topology is critical for electromagnetic spectrum situation awareness and non-cooperative communication countermeasures. Traditional topology inference methods based on multidimensional Hawkes process (MHP) suffer from low accuracy due to the fixed kernel function assumption, which fails to capture complex communication dynamics. This paper proposes an improved MHP-based topology inference method for non-cooperative wireless networks. We first construct an observation framework to collect communication event sequences of target nodes. A datadriven kernel function estimation approach is introduced to replace the manually predefined kernel, and a Majorize-Minimize (MM) algorithm is designed to iteratively optimize the model parameters. Symmetrization and binarization post-processing steps are further applied to eliminate indirect connections and asymmetric inference errors. Simulation results demonstrate that the proposed method achieves a structural Hamming distance (SHD) of 2, outperforming conventional MHP, transfer entropy (TE), and Granger causality (GC) methods. It also exhibits superior robustness under varying observation durations, network scales, and packet loss rates.

"Paper Title: Joint Beamforming and STAR-RIS Design for Low-Altitude Maritime Integrated Sensing and Communication Network

Author(s): Haobo Xu, Bin Lin, Sen Li, Chenglei Zong

Presenter: Haobo Xu, Dalian Maritime University, China

**17:05-17:20
ET3388**

Abstract: Low-altitude maritime networks require reliable communication and real-time sensing for autonomous maritime services, but severe propagation uncertainty, platform mobility, and limited infrastructure pose challenges to conventional wireless designs. Integrated sensing and communication (ISAC) with programmable surfaces provides a promising solution, yet maintaining highly reliable and secure communication while preserving sensing accuracy remains challenging in dynamic maritime environments. This work studies secure transmission in an unmanned aerial vehicle (UAV)-mounted simultaneously transmitting and reflecting reconfigurable intelligent surface (STAR-RIS)-assisted low-altitude maritime ISAC (LM-ISAC) network. The base station (BS) serves communication unmanned surface vehicles (Comm-USVs) and directly senses a receiver-limited sensing unmanned surface vehicle (Sen-USV) that may also overhear Comm-USV data streams. The STAR-RIS reshapes legitimate/eavesdropping channels. We maximize the secrecy-rate surrogate by jointly optimizing BS beamforming, STAR-RIS coefficients and placement under communication-signal-to-interference-plus-noise ratio (SINR), sensing-SNR and Cramér-Rao lower bound (CRLB) constraints. The non-convex problem is handled by joint STAR-RIS placement and beamforming alternating optimization



(JSPB-AO), where restricted successive convex approximation (RSCA) updates placement and projected spatial-frequency domain optimization (PSFDO) updates beamforming vectors and STAR-RIS coefficients. Simulations under three-ray evaporation-duct channels show secrecy gains, the sensing--security tradeoff and mismatch sensitivity."

**17:20-17:35
ET3367**

Paper Title: Design of a Doppler-Aware Semantic Communication System for Coastal Low-Altitude Scenarios

Author(s): Dongxin Lv, Bin Lin, Xiaoling Han

Presenter: Dongxin Lv, Dalian Maritime University, China

Abstract: In coastal low-altitude scenarios, relative motion between Unmanned Aerial Vehicles (UAVs) and maritime targets causes Doppler shifts and image motion blur, degrading wireless image reconstruction. Conventional systems treat Doppler as channel impairment to be compensated, ignoring its motion semantics. In this paper, we propose a Doppler-Aware Semantic Communication System (DASCS), a UNet-based system that injects Doppler shifts into encoder bottleneck features via FiLM, allowing the encoder to adjust its representations in response to different motion states. Simulation experiments demonstrate that the semantic encoder produces differentiated feature responses according to Doppler values. With Doppler information introduced, 96.8% of test images exhibit positive reconstruction gains.

**17:35-17:50
ET3338**

Paper Title: Energy-Efficient LDPC Decoding via Adaptive Layer Scheduling for CPU Platforms

Author(s): Xiaoxiao Chen, Yihao Shen, Shan Cao, Zhiyuan Jiang, Sheng Zhou

Presenter: Xiaoxiao Chen, Shanghai University, China

Abstract: The development of open radio access networks (O-RANs) is increasing the need for flexible and energy-aware software-defined baseband processing on general-purpose platforms. This paper presents an energy-efficient LDPC decoder optimized for x86 CPUs using Advanced Vector Extensions (AVX-512). Through a combination of algorithmic and implementation optimizations, including adaptive layer scheduling, memory-copy-based cyclic shift processing, and a layer-aware early stopping strategy, the proposed decoder improves decoding efficiency while reducing unnecessary computational overhead. Simulation results show a peak single-core throughput of 1056.9 Mbps, representing a 170.2% improvement over state-of-the-art software decoders, and up to 2.6 Gbps under high-SNR conditions with early stopping. Moreover, the proposed decoder achieves up to 13.24 times higher computational energy efficiency than the srsRAN baseline while maintaining bit error rate performance.

These results demonstrate the potential of the proposed decoder for energy-efficient software decoding in O-RAN systems.



Paper Title: Physics-Driven Conditional Diffusion Model for Channel Knowledge Map Generation

Author(s): Yu Chen, Jiao Chen, Jianhua Tang, Zhenyu Weng

Presenter: Yu Chen, South China University of Technology, China

17:50-18:05
ET4431

Abstract: A channel knowledge map (CKM) provides location-specific channel priors for 6G environment-aware communications, reducing real-time channel state information (CSI) acquisition overhead through offline construction and online query. However, accurate CKM construction is challenging because practical observations are sparse and incomplete. We propose a physics-driven conditional diffusion framework that uses an analytical free-space prior to represent distance-dependent attenuation and integrates environmental geometry, observation masks, and sparse measurements as structured conditions. A latent decoupled diffusion formulation further models deterministic attenuation and stochastic noise separately. Experiments on RadioMapSeer demonstrate that the proposed method outperforms representative GAN-based and diffusion-based baselines in generation accuracy and structural fidelity.



TECHNICAL SESSIONS >>>

TS10: Mobile, Wireless and Green Communication Networks (II)

Session Chair: Jiachen Sun, The Hong Kong University of Science and Technology, China

Time 16:00-18:00 | Oct. 17, 2026

Venue Meeting Room 2

TALK DETAILS

Time	Presentation
16:00-16:15 ET2199	Paper Title: Hierarchical Multi-Agent Reinforcement Learning for LEO-UAV Collaborative Task Offloading in SAGIN Author(s): Zhixiong Yan, Yuanguo Bi, Tianxu Zhang, Yanbo Fan, Enchao Zhang Presenter: Yanbo Fan, Northeastern University, China Abstract: Space-air-ground integrated networks (SAGINs) have emerged as a promising architecture for providing low-latency and energy-efficient computing services in infrastructure-limited areas. However, efficient task offloading in SAGIN remains challenging due to the dynamic network topology, unstable communication links, and the heterogeneous spatial and temporal characteristics of satellites and unmanned aerial vehicles (UAVs). To address these issues, we investigate a hierarchical SAGIN-enabled task offloading problem in which low Earth orbit (LEO) satellites and UAVs collaboratively serve ground users. We first develop a hierarchical task offloading framework with a decoupled uplink-downlink communication mechanism, and then formulate a joint optimization problem that minimizes system energy consumption and task delay. To solve the resulting non-convex mixed-integer problem, we propose a hierarchical multi-agent reinforcement learning algorithm, termed HAQMIX, where LEO satellites act as high-level agents for macro-level coordination, and UAVs act as low-level agents for real-time decision-making. Simulation results demonstrate that HAQMIX consistently outperforms benchmark schemes in terms of convergence performance, energy consumption, task delay, and task failure rate.
16:15-16:30 ET2225	Paper Title: An Enhanced Plane Wave Synthesis Method Based on Received Power Matching Author(s): Chenyi Wang, Chunjing Hu, Haomin Wang, Yushen Wang, Yong Li Presenter: Chenyi Wang, Beijing University of Posts and Telecommunications, China Abstract: In multi-probe anechoic chamber (MPAC) systems, conventional plane wave synthesis (PWS) methods mainly aim at accurate emulation of the complex electromagnetic field. However, in practical wireless communication systems, the communication performance of terminal devices is directly affected by the received power. To address this issue, this paper proposes an enhanced PWS method based on received-power matching. The proposed method employs reference signal



received power (RSRP) matching as the primary optimization objective while maintaining electric-field amplitude and phase constraints, thereby achieving a balance between received-power matching and complex electric-field emulation. Simulation results show that the proposed method achieves accurate RSRP matching while maintaining reasonable electric-field emulation accuracy and a relatively low error vector magnitude (EVM).

Paper Title: Asynchronous Model Partition and Resource Allocation for Multi-Agent Device-Edge Collaborative Inference

Author(s): Sichen Liu, Chen Xu, Ziwen Ling

Presenter: Sichen Liu, Beijing University of Posts and Telecommunications, China

**16:30-16:45
ET3308**

Abstract: Real-time intelligent applications demand strict latency performance. Deep Neural Network (DNN) collaborative inference, which splits the model into two parts deployed on User Equipments (UEs) and Mobile Edge Computing (MEC) servers respectively, effectively reduces inference latency for edge Artificial Intelligence (AI) tasks. However, MEC servers' limited resources lead to bottlenecks when multiple UEs concurrently execute complex DNN inference. To address this challenge, we propose an asynchronous model collaboration framework for multi-agent device-edge networks. Specifically, model partition and resource allocation are jointly optimized across two time scales to minimize system latency, enabling a fine-grained temporal response to resource changes. It is a time-continuous mixed-integer non-convex problem which is intractable for traditional optimization methods. Therefore, we propose a Deep Reinforcement Learning-based Edge Scheduling-Device Partitioning (DRL-ESDP) algorithm to asynchronously determine model partition points and resource allocation. Simulation results show that DRL-ESDP converges stably compared with benchmarks, and can reduce system latency under different bandwidths and edge computing resource, with this effect being more significant in resource-scarce environments.

Paper Title: Deep Unfolding-Based DOA Estimation for RIS-Assisted Maritime ISAC System

Author(s): Shuojie Cai, Bin Lin, Haobo Xu, Miyuan Zhang, Yi Wang, Sen Li

Presenter: Shuojie Cai, Dalian Maritime University, China

**16:45-17:00
ET3368**

Abstract: This paper addresses illegal unmanned aerial vehicle (UAV) sensing in complex and dynamic nearshore low-altitude maritime environments and proposes a robust and high-accuracy two-dimensional (2D) direction-of-arrival (DOA) estimation method for active reconfigurable intelligent surface (RIS)-assisted integrated sensing and communication (ISAC) systems. A unified signal model is established for an active RIS-assisted shore-based base station, an illegal UAV target, and legitimate users, incorporating RIS amplification gain and noise effects. Target spatial information is extracted from the sample covariance matrix



of echo snapshots. To address performance degradation caused by sea clutter, amplification noise, and limited snapshots, a residual-guided deep unfolding (DU) alternating direction method of multipliers (ADMM) sparse reconstruction method is proposed, which unfolds the ℓ_1 -regularized optimization into a physically interpretable network with learnable parameter adjustment and residual feedback. A cascaded dual-branch structure is designed for 2D angle estimation. Simulation results demonstrate that the proposed method achieves improved DOA estimation accuracy and robustness compared with 2D-MUSIC, ADMM-Net, and 2D-OMP.

**17:00-17:15
ET2112**

Paper Title: Massive MIMO Multi-Beamforming

Author(s): Fan Xingyuan, Li Songting, Xiang Yiran, Peng Shihao, Chen Lihu, Zhao Yong

Presenter: Fan Xingyuan, National University of Defense Technology, China

Abstract: Abstract—Massive multiple input and multiple output (MIMO) multi-beam phased array antenna (PAA) is the core requirement of multi-function, multi-target and large capacity in future highspeed communication systems, such as 5G/6G, mobile satellite communication, and radar, etc., and also the infrastructure of massive information interaction in intelligent society. How to achieve high-quality multi-beamforming (MBF) capability while ensuring low power consumption, low cost, and miniaturization of PAAs has always been a cutting-edge research topic. This paper comprehensively reviews the research status of multibeamforming phased array antennas, including their hardware architecture, working principle, advantages and disadvantages, and high robustness design. This review provides a systematic reference for developing high-performance, adaptable MBF phased array architectures for future wireless and radar systems.

**17:15-17:30
ET2157**

Paper Title: Joint Optimization of Near-Field Movable Antenna Positioning and SWIPT Resource Allocation

Author(s): Jiaxin Hao, Xueyan Cao, Shubin Wang

Presenter: Jiaxin Hao, Inner Mongolia University, China

Abstract: This paper studies a near-field movable antenna (MA)-assisted simultaneous wireless information and power transfer (SWIPT) system, where the joint design of MA positioning, beamforming, and power splitting is optimized to maximize the sum rate. A refined channel model is developed by integrating multipath-scattering features and engineering constraints to capture the channel's spatial sensitivity and non-stationarity. To tackle the resulting non-convex problem, a hybrid alternating optimization framework is proposed that employs successive convex approximation and improved projected gradient ascent methods with closed-form gradients. Numerical results demonstrate that the proposed scheme achieves sum-rate gains of at least 112.26%, 49.56%, 9.09%, and 18.95% over the fixed-position antenna, random-position antenna, particle swarm optimization, and optimal-position antenna with maximum-ratio transmission benchmarks,



respectively, across all simulation settings. Spectral efficiency and complexity are also analyzed, validating the effectiveness of the proposed framework.

Paper Title: Large Model Enhanced Underwater Acoustic Channel Data Augmentation

Author(s): Hao Zhao, Fei Ji, Miaowen Wen, Jianhua Tang, Hua Yu, Jie Xu

Presenter: Hao Zhao, Guangzhou Maritime University, China

**17:30-17:45
ET4493**

Abstract: Artificial intelligence-based algorithms play a critical role in designing modern underwater acoustic communication

(UAC) systems. The performance of these models depends heavily on the volume of training data. However, real-world underwater acoustic (UWA) channel data are scarce, and the associated measurement campaigns are both challenging and expensive. To address this issue, UWA channel simulation and modeling have emerged as effective approaches for data augmentation. In this paper, we propose a large-model-enhanced data augmentation framework for UWA channels, leveraging the generative pretrained transformer (GPT) architecture and a U-Net framework with multi-scale information, named UChannelGPT. We validate the accuracy of the generated simulation data using a classic OFDM communication system, and the corresponding bit error rate (BER) results confirm the method's effectiveness. In addition, we analyze the power delay profile (PDP), training loss, and ablation experiments to assess the model's performance further

Paper Title: Latency-Aware Adaptive Inference for Low-Altitude UAV Visual Perception

Author(s): Haoyi Wang, Jiao Chen, Zengzhi Xu, Jianhua Tang, Zhenyu Weng

Presenter: Haoyi Wang, South China University of Technology, China

**17:45-18:00
ET4432**

Abstract: Low-altitude unmanned aerial vehicle (UAV) networks are increasingly expected to support embodied environment perception. However, in dynamic low-altitude scenarios, UAV are typically constrained by limited computational capability and inference latency budgets. To address this issue, this paper proposes low-altitude latency-aware inference (LALI) framework, by adaptively enabling inference model sub-units based on latency budget. LALI adopts a UAV-edge collaborative architecture, where a lightweight prefix network is executed on the UAV and a schedulable suffix network is executed on the edge server. A neural network-based scheduler is designed to generate budget-conditioned execution plans for fine-grained control of computation units at the sub-module level, enabling the inference path to adapt to both input content and latency constraints. Experiments on the UAVid datasets show that LALI consistently achieves a better accuracy-efficiency trade-off than baselines. It significantly reduces inference latency at the cost of only marginal accuracy degradation, demonstrating its practical feasibility for low-altitude scenarios.

TECHNICAL SESSIONS >>>

TS11: Reconfigurable Intelligent Surfaces and Non-Terrestrial Networks

Session Chair: Peng Wang, Singapore University of Technology and Design, Singapore

Time 16:00-18:05 | Oct. 17, 2026

Venue Meeting Room 3

INVITED TALK | 16:00-16:20

Beam-Structured Transmission for Massive MIMO LEO Satellite Communications

Ding Shi, Purple Mountain Laboratories, China

Abstract: Satellite communications are expected to play an essential role in enabling global and ubiquitous connectivity for future 6G networks. In particular, low-Earth-orbit (LEO) satellite systems have attracted increasing attention because of their wide coverage, relatively low propagation latency, and flexible deployment. Massive multiple-input multiple-output (MIMO) technology can substantially enhance spectral efficiency and system capacity. However, massive MIMO LEO satellite communications faces several challenges, including rapid channel variation, large-dimensional signal processing, and limited onboard computational resources. This speech presents a beam-structured transmission framework for massive MIMO LEO satellite communications. By exploiting the inherent spatial characteristics and beam-domain structure of satellite channels, high-dimensional space-domain processing can be transformed into a more compact and structured form. This framework facilitates efficient utilization of spatial degrees of freedom and enables scalable transmission with reduced channel acquisition, computational, and hardware complexity. The presented results demonstrate the potential of beam-structured processing to support high-capacity and low-complexity transmission, providing a promising technical approach for future 6G satellite communication networks.



TALK DETAILS

Time	Presentation
16:20-16:35 ET2194	Paper Title: Joint Optimization for RIS-Aided THz-OTFS ISAC Systems Author(s): Ziwen Han, Xufang Wang, Yi Wu Presenter: Xufang Wang, Fujian Normal University, China Abstract: This paper investigates a signal-to-noise ratio (SNR)-constrained terahertz (THz) integrated sensing and communication (ISAC) system assisted by a reconfigurable holographic surface (RHS) and a reconfigurable intelligent surface (RIS). The RHS enables large-aperture transmission via amplitude-controlled



holographic beamforming, while the RIS establishes a controllable reflected link to mitigate THz blockages, where users are located in its near-field region. We formulate a non-convex problem to maximize the multiuser sum rate under radar SNR, transmit power, RHS amplitude, and RIS unit-modulus constraints. To address this problem, an alternating optimization (AO) framework is proposed, where the sensing constraint is convexified via a conservative SNR lower bound, the RHS amplitude and digital beamformer are optimized via fractional programming, and the RIS phase shifts are updated on the unit-modulus manifold using a Riemannian conjugate gradient method. Simulation results show that the proposed scheme approaches the communication-only upper bound, outperforms conventional phased-array baselines, and reveals the tradeoff between communication and sensing performance.

Paper Title: RIS-Assisted Distributed TDMA Scheme for Spatial Reuse in Ad-Hoc Networks

Author(s): Chaofan Tu, Weijie Xie, Jin Wang, Yihang Tu, Kai Xiong

Presenter: Kai Xiong, University of Electronic Science and Technology of China, China

**16:35-16:50
ET1075**

Abstract: Distributed time-division multiple access (TDMA) protocols are widely adopted in Ad-Hoc networks for their decentralized collision avoidance. However, aggressive spatial reuse inevitably introduces severe co-channel interference. To resolve this problem, this paper proposes a reconfigurable intelligent surfaces (RIS)-assisted distributed TDMA framework that strategically decouples medium access control from physical-layer enhancement. We augment the conventional TDMA frame with a lightweight RIS Report phase, enabling scheduled transmitters to autonomously forward slot assignments, multicast receiver groups, transmit powers, and quality-of-service (QoS) requirements to a local RIS coordinator. The RIS controller computes a slot-wise common reflection vector to balance concurrent multicast streams within a defined coordination zone. We formulate a QoS-constrained weighted logarithmic utility maximization problem and introduce a tractable QoS-aware penalty surrogate to guide discrete phase search. Building upon this, a QoS-Aware Element-Wise Greedy (QAEG) algorithm is developed to achieve rapid, monotonic convergence over finite phase-shift codebooks. Extensive simulations demonstrate that the proposed framework significantly outperforms direct-transmission and random-phase baselines. By harmonizing decentralized MAC operations with intelligent radio environment control, this work establishes a practical, low-overhead paradigm for RIS-empowered multicast communications in next-generation Ad-Hoc networks.

**16:50-17:05
ET1088**

Paper Title: Escort UAV-Mounted IRS Aided Electromagnetic Stealth via Joint Position and Reflection Optimization

Author(s): Quanyu Chen, Jiansong Miao, Fuhao Liu, Yunshen Guo, Xinpei Chen, Yueyue Rong, Rui Cheng, Jingyu Feng



Presenter: Quanyu Chen, Beijing University of Posts and Telecommunications, China

Abstract: Electromagnetic stealth (ES) is crucial for protecting unmanned aerial vehicle (UAV) targets against unauthorized radar detection, while conventional passive stealth approaches usually suffer from limited adaptability to dynamic radar-target geometries. To address this issue, this paper proposes an escort-UAV-mounted intelligent reflecting surface (IRS) aided electromagnetic stealth framework, where an IRS carried by a cooperative UAV assists a protected target UAV in suppressing the echo received by a monostatic unauthorized radar station (URS). Unlike existing target-mounted IRS designs, the proposed architecture exploits both the IRS reflection coefficients and the escort UAV position as controllable degrees of freedom. We formulate a joint position-and-reflection optimization problem to minimize the received signal-to-noise ratio (SNR) at the URS under a range-Doppler resolution-cell constraint. To solve this problem, we first derive a closed-form solution for the IRS reflection subproblem under continuous amplitude-phase constraints, based on which the original high-dimensional joint optimization problem is equivalently reduced to a two-dimensional escort-position optimization problem. Then, a reduced-dimension joint position and reflection optimization (RD-JPRO) algorithm is developed to efficiently determine the escort UAV position and recover the IRS reflection coefficients. Simulation results demonstrate that the proposed design achieves a lower received SNR at the URS and superior stealth performance compared with benchmark schemes.

Paper Title: Local Power-Escalation Recovery for Multi-Flow UAV Networks under Jamming

Author(s): Wanyu Xiang, Chen Han, Xinjin Lu, Yusheng Li, Han Liao, Lei Yu

Presenter: Wanyu Xiang, National University of Defense Technology, China

Abstract: Unmanned aerial vehicle (UAV) ad hoc networks under strong jamming suffer from disrupted relay nodes that sever multiple concurrent data flows. This paper formulates the resulting multi-flow topology recovery as a delay-constrained optimization and proposes the Local Power-Escalation Recovery (LPER) algorithm, a lightweight training-free distributed strategy in which each parent node incrementally raises its transmit power until a hop-feasible bypass is found. Benchmarked against Greedy-Hop, Max-Power, and Optimal Upper Bound under a strictly concurrent evaluation model, LPER achieves recovery rates identical to those of Max-Power while consuming 60--80% less power, and closely tracks Optimal Upper Bound with a recovery gap of at most 0.5%~percentage points. These findings confirm that a lightweight deterministic algorithm can achieve near-optimal multi-flow recovery at a fraction of the energy cost of brute-force escalation, without the training overhead of learning-based methods.

17:05-17:20
ET2164



**17:20-17:35
ET3253**

Paper Title: Marine Mobile Network Deployment: Architecture, Evaluation and Planning

Author(s): Lei Guo, Zhongqiu Xiang, Binjie Li, Shuo Sun, Qiang Zhang, Chao Zheng, Pan Wang, Fan Chen, Yaofei Yan

Presenter: Lei Guo, China Mobile Group Design Institute Co., Ltd., China

Abstract: With the rapid growth of maritime activities and the emerging maritime economy, reliable wireless communication over the ocean has become essential for offshore operations, including transportation, energy exploitation, and maritime safety. However, maritime communication networks face unique challenges due to sparse base station deployment, large coverage areas, and complex propagation over sea surfaces. This paper presents a comprehensive framework for offshore base station selection and antenna deployment optimization. A multi-objective optimization approach is introduced to jointly consider investment efficiency and spatial distribution, generating Pareto-optimal deployment solutions. A maritime digital twin simulation platform is employed to evaluate coverage performance across different antenna configurations, including conventional, high-gain, and dual high-gain antennas. The framework provides guidance for balancing coverage enhancement, spatial robustness, and infrastructure investment, offering a systematic tool for maritime communication networks.

**17:35-17:50
ET3400**

Paper Title: Deep Reinforcement Learning-Aided Handover Scheme for LEO-Assisted Communications

Author(s): Zefeng Luo, Sipei Lai, Xianda Wu, Yong Liu, Yunfei Li, Shaodan Ma

Presenter: Sipei Lai, South China Normal University, China

Abstract: Low Earth Orbit (LEO) satellite networks, characterized by low cost, wide coverage and easy deployment, are an important part of future non-terrestrial networks and an essential way to cope with the explosive growth in the number of users and demand. Compared with users in terrestrial networks, LEO satellites are in a high-mobility state, and this dynamic characteristic leads to frequent handovers. To address this challenge, we propose a Double Deep Q-Network learning-based Multi-Objective Handover Algorithm (DDQN-MOHA) in this paper. Compared with existing handover studies, the proposed DDQN-MOHA can provide outstanding dynamic adaptability and performance stability by designing a dynamic reward function with hybrid weights, and a dual-network to mitigate Q-value overestimation. Numerical results show that the proposed DDQN-MOHA outperforms the traditional methods in terms of the system throughput, the handover time, and the blocking rate in LEO-assisted communications.

**17:50-18:05
ET3387**

Paper Title: Semantic Multiple Description Coding for Adversarial Channels with Partial-Band Jamming

Author(s): Sili Liu, Rong Lv, Lu Xinjin, Ru-Han Chen, Junxiang Qin, Yong-Gang Zhu



Presenter: Sili Liu, National University of Defense Technology, China

Abstract: To tackle the multi-frequency suppression jamming issue in frequency-hopping communication under non-cognitive scenarios, in this paper we construct a partial subchannel erasure jamming channel model based on the compound channel and analyzes its channel capacity. Furthermore, a semantic multiple description coding scheme based on convolutional neural network is proposed. In the training process, partial-band suppression jamming is modeled as the erasure of symbols outputted from corresponding subchannels. The receiver is capable of recovering the original image when partial descriptions are missing. A weighted loss function integrating pixel fidelity, core semantic feature fidelity, and regularization terms is designed to realize efficient joint source-channel coding. Simulation results verify that the proposed scheme can achieve reliable transmission of image pixel information and core semantic features without prior awareness of jamming characteristics. Moreover, the scheme improves the compression capability of image sources and enables reliable image transmission over partial-band jamming channels. Compared with the conventional separate source-channel coding framework based on JPEG and Reed–Solomon codes, the proposed scheme achieves outstanding rate-distortion performance.



TECHNICAL SESSIONS >>>

TS12: Internet-of-Things, Sensor Networks and Edge Computing (I)

Session Chair: Zhuang Xie, National University of Defense Technology, China

Time 16:00-18:00 | Oct. 17, 2026

Venue Meeting Room 4

TALK DETAILS

Time	Presentation
16:00-16:15 ET1077	Paper Title: Generalized Approximate Message Passing-Bundle Adjustment Based Cooperative Localization with AOA Measurements Author(s): Zhaorui Jiang, Shengchu Wang, Yidian Zuo Presenter: Shengchu Wang, Beijing University of Posts and Telecommunications, China Abstract: This paper proposes generalized approximate message passing-bundle adjustment (GAMP-BA) localizer with angle-of-arrival (AOA) measurements in three-dimensional scenarios. A single directional scan can yield an AOA, but angle-only networks have scale ambiguity unless anchored. Calibrated anchors with known poses are introduced so that the global scale is fixed. For three-dimensional positioning, GAMP-BA localizer is proposed. Specifically, GAMP and BA are separately used for positions and orientations updates. GAMP propagates the nonlinear AOA likelihood through approximate Bayesian message passing on the observation model, rather than linearization of angle residuals as in Gauss-Newton style BA, which can accumulate linearization error. To mitigate premature convergence to poor local minima in the final GAMP iterations, a Gaussian mixture model (GMM) prior on agent positions adaptively widens effective uncertainty before the convergence of GAMP iterations. Based on the optimized positions, orientations are updated by BA since GAMP cannot optimize the orientations. To mitigate GAMP's sensitivity to initialization, reliable initial positions and orientations are obtained after a weighted-incremental stage followed by joint BA, and per-agent weights encode measurement reliability. AOA measurements at the BA warm start further set a geometry informed diagonal GAMP position prior variance that reflects local observability instead of an isotropic scale. Simulations show that GAMP-BA improves both position accuracy and absolute rotation error (ARE) relative to BA-centric baselines, with further gains from the weighting and GMM mechanisms.
16:15-16:30 ET1084	Paper Title: Joint Time Allocation and Beamforming Design in TDD Symbiotic Radio for Ambient IoT Networks Author(s): Yao Wei, Jungang Ge, Tao Huang, Jun Wang Presenter: Jungang Ge, China Telecom Research Institute, China



Abstract: Ambient Internet of Things (IoT) has emerged as a promising paradigm for enabling massive low-power device connectivity by integrating energy harvesting and backscatter communication techniques. In this paper, we propose a time-division duplexing (TDD) symbiotic radio system for ambient IoT, where the uplink and downlink radio-frequency (RF) signals are reused to support energy harvesting and backscatter transmission of ambient IoT devices, respectively. Specifically, the ambient IoT devices first harvest energy from the uplink signals transmitted by the user, and then modulate and reflect the downlink signals from the access point to convey their own information. We first analyze the impact of uplink/downlink time allocation on device activation, and derive a threshold-based activation condition with respect to the time allocation. The achievable rate of the user and ambient IoT devices are then derived by incorporating the device activation states. Based on the derived expressions, we formulate a joint time allocation and beamforming problem to maximize the sum rate of ambient IoT devices, subject to the transmit power constraint and user outage probability constraint. To solve this problem, we exploit the threshold-based activation structure to reduce the time allocation search to a finite candidate set, and optimize the downlink beamforming via S-lemma and successive convex approximation (SCA). Numerical results show that the proposed design can significantly enhance the ambient IoT transmission while satisfying the reliability requirement of the user transmission.

Paper Title: LBR-Net: Open-World Encrypted Attack Traffic Recognition via Class-Wise Latent Boundary Modeling

Author(s): Yixin Jiang, Kaitian Huang, Yuan Pan, Wenqian Xu, Yiwei Yang, Yunan Zhang, Liang Xuan, Guocong Feng, Chao Hong, Leyu Bi, Zhihao Zheng, Shituo Ma
Presenter: Zhihao Zheng, China Southern Power Grid Company Limited, China

**16:30-16:45
ET2116**

Abstract: Encrypted traffic recognition plays an important role in modern network intrusion detection, but most existing methods are developed under the closed-set assumption, where all attack categories are known during training. In practical environments, however, novel attacks may continuously emerge, requiring traffic analysis systems to not only recognize known classes but also reject unseen ones and remain adaptable over time. This motivates us to model each known attack class by its own latent acceptance region, so that unknown attacks can be identified as out-of-distribution samples relative to all known classes. To address this issue, this paper proposes LBR-Net, an open-world encrypted attack traffic recognition framework based on class-wise latent boundary modeling. Specifically, an independent variational autoencoder is trained for each known class to characterize its latent distribution, and Mahalanobis distance is adopted to construct class-specific acceptance regions for unknown attack rejection. A known-class classifier is further introduced to assign labels to samples that fall inside the known latent boundary space. To support efficient model evolution, we employ a



16:45-17:00
ET2114

lightweight incremental update strategy that refreshes the known-class classifier using representative historical samples and newly confirmed class data, without retraining all previously learned latent boundary models. The overall design is concise and practical, making it suitable for open-world encrypted attack traffic analysis under limited computational budgets.

Paper Title: SCMSector: An Adaptive Feature Selection Method for Encrypted Traffic Analysis Based on Structural Causal Model

Author(s): Liang Xuan, Guocong Feng, Yixin Jiang, Kaitian Huang, Yuan Pan, Wenqian Xu, Yiwei Yang, Yunan Zhang, Chao Hong, Leyu Bi, Shituo Ma, Miaohua Zhuo

Presenter: Shituo Ma, China Southern Power Grid Company Limited, China

Abstract: Encrypted traffic analysis is essential for network security and management, yet the deployment of deep learningbased approaches in limited resource environments is severely constrained by computational and latency requirements. Existing feature selection methods for encrypted traffic often rely on correlation-based metrics, leading to high inter-feature redundancy caused by shared statistical derivations in CICFlowMeter features. We propose SCMSector, a three-stage adaptive feature selection framework grounded in a measurement-oriented Structural Causal Model (SCM). In the first stage, we construct a tier-constrained graph over CICFlowMeter features using graphmasked continuous optimization. In the second stage, we design a multi-dimensional evaluation metric system spanning causalrelevance, structural, classification, and explainability signals. In the third stage, we propose an adaptive fusion-based feature ranking algorithm that prioritizes structural evidence while balancing discriminative power and interpretability. Experiments on CIC-IDS2017, CSE-CIC-IDS2018, and CIC-DDoS2019 demonstrate that SCMSector provides compact feature subsets across feature budgets from 5 to 30 while maintaining an inference latency of 0.0384 ms per flow with the top-10 selected features. The learned graph identifies upstream measurement variables and interpretable feature groups that are often obscured by purely correlation-based rankings.

17:00-17:15
ET3292

Paper Title: Confidence-Calibrated Proactive Coordination for Multi-UAV Vehicular Networks

Author(s): Zhicheng Xiong, Hao Wu

Presenter: Zhicheng Xiong, Beijing Jiaotong University, China

Abstract: Multi-UAV-assisted vehicular networks must reposition limited aerial service capacity as traffic demand shifts across space and time. Reactive controllers respond only after demand hotspots move, while direct forecast injection may amplify prediction errors and induce redundant coordination. This paper proposes CUPA-MADDPG, integrating history-only ensemble demand forecasting with held-out uncertainty calibration, capacity-constrained UAV – hotspot responsibility



assignment, and reliability-gated decentralized control under centralized planning. Under a frozen evaluation protocol with 10 training seeds and 50 final-test episodes per seed and scenario, CUPA-MADDPG achieves an SDR of 0.62537 in the moving-hotspot scenario, compared with 0.58811 for Reactive-MATD3, with a paired difference of 0.03726 and an unadjusted two-sided Wilcoxon $p=0.0020$. No consistent SDR advantage is observed under burst demand or abrupt hotspot shifts, indicating that the benefit of calibrated proactive planning is scenario dependent.

Paper Title: AURA: Availability-Aware Uncertainty-Guided Resource-Efficient Acquisition for Wearable Activity Recognition

Author(s): Wanyu Yang, Yandi Li, Jianxiang Guo

Presenter: Yandi Li, Beijing Normal-Hong Kong Baptist University, China

17:15-17:30
ET4474

Abstract: Multi-sensor wearable systems can improve human activity recognition (HAR), but continuously activating all body sensors incurs unnecessary sensing overhead and assumes persistent sensor availability. We propose AURA, an availability-aware uncertainty-guided framework for online auxiliary-sensor acquisition. AURA keeps a wrist IMU as the always-on sensing path and invokes auxiliary sensing only when the wrist prediction is uncertain. It then selects from the currently available chest and ankle sensors using a lightweight UCB1 policy and updates sensor preferences from post-acquisition confidence gain, without requiring activity labels during deployment-time adaptation. Under subject-independent evaluation on PAMAP2, AURA improves Macro-F1 from 0.7074 with wrist-only sensing to 0.7854 at its primary operating point, compared with 0.8539 under continuous three-sensor sensing. This recovers 53.25% of the full-sensing Macro-F1 gain while using only 13.45% of its auxiliary-sensor activation volume. Performance degrades gracefully under bursty auxiliary-sensor outages, and the same qualitative recognition--sensing tradeoff is reproduced on a broader eight-subject cohort.

Paper Title: BARSA: Incentive-Compatible Resource Scheduling for Multi-Task Federated Learning via Double-Sided Auction

Author(s): Jialin Yang, Liang Tang, Huilin Li, Wei Wang, Zhaohui Li, Yongmin Zhang, Tao Zhang

Presenter: Jialin Yang, Central South University, China

17:30-17:45
ET1035

Abstract: Federated learning (FL) over IoT sensor networks requires scheduling heterogeneous compute and bandwidth resources across multiple concurrent monitoring tasks. Each task demands a careful balance between training latency and model accuracy, while self-interested sensors make strategic participation decisions to maximize their own benefit. Existing methods either ignore such strategic behavior or fail to scale to large networks. We model this resource scheduling problem as a multi-dimensional double-sided auction and propose the



Bilateral Auction-based Resource Scheduling Algorithm (BARSA). BARSA decomposes the global optimization into two tractable stages: a convex subproblem for per-task resource procurement, and a multi-round auction for device selection. In the auction, monitoring targets bid according to marginal accuracy gains and sensors set asking prices reflecting their individual cost constraints. The resulting mechanism maximizes social welfare while guaranteeing individual rationality and weak budget balance in polynomial time. Experiments on simulated sensor networks demonstrate that BARSA consistently surpasses baselines in social welfare, model accuracy, resource utilization, and task admission rate. The performance advantage becomes more pronounced as resource contention intensifies.

Paper Title: Agentic AI-Enabled Blockchain Sharding for Trusted Token Circulation in LLM-Driven MAS

Author(s): Haoxiang Luo, Hongfang Yu, Hongke Zhang

Presenter: Haoxiang Luo, King Abdullah University of Science and Technology, Saudi Arabia

17:45-18:00
ET3310

Abstract: The proliferation of Large Language Models (LLMs) has driven the evolution of autonomous Multi-Agent Systems (MAS), where inter-agent collaboration relies on a circulation of word tokens (the minimal semantic and computational unit of LLMs). However, token-level interactions introduce critical risks, including adversarial token injection, cascaded hallucination propagation, and untraceable reasoning tampering, which traditional end-to-end content verification cannot mitigate. Blockchain consensus provides decentralized trust but suffers from scalability bottlenecks, while existing sharding schemes fail to capture the semantic coupling of token-level agent interactions. This paper proposes a novel Agentic AI-empowered blockchain sharding framework for trusted token-level circulation. We model the dynamic sharding problem as a Partially Observable Markov Decision Process (POMDP), leveraging retrieval-augmented LLMs with chain-of-thought to approximate belief states and semantically cluster agents with tight token interactions, minimizing cross-shard circulation latency. We further design role-aware credibility models and token-level Zero-Knowledge Proofs of Reasoning (ZK-PoR) for verifying per-token reasoning integrity. Hardware-in-the-loop experiments show our scheme outperforms benchmarks in consensus efficiency and token circulation trustworthiness.

TECHNICAL SESSIONS >>>

TS13: Intelligent and Semantic Communications

Session Chair: Hai-Peng Ren, National Key Laboratory of Land & Air Based Information Perception & Control, China

Time 16:00-18:15 | Oct. 17, 2026

Venue Meeting Room 5

INVITED TALK | 16:00-16:20

Navigating the Black-Box: Intelligent Resource Allocation for Task-Oriented Communications

Suzhi Bi, Shenzhen University, China

Abstract: In post-disaster scenarios, uncrewed aerial vehicle (UAV)-enabled integrated localization and communication (ILAC) systems provide critical emergency coverage for multiple mobile ground users. However, existing dynamic UAV deployment methods are mostly limited to single-user scenarios or static configurations, making them inadequate for the simultaneous tracking and communication needs of multiple moving victims in post-disaster environments. To address this, we propose a lightweight online joint trajectory optimization framework based on the alternating sing-UAV maneuver (ASUM) strategy, where only one UAV maneuvers per time slot while others hover. By decoupling the joint planning into a two-layer sequential decision process, the framework leverages extended Kalman filtering (EKF) for dynamic user state prediction and successive convex approximation (SCA) for single-UAV trajectory convexification, dynamically reshaping swarm geometry to guarantee dual quality-of-service constraints for all users. Numerical results demonstrate 59.1% and 54.2% reductions in per-UAV movement distance over rigid formation and two-fixed-one-moving benchmarks, respectively, with an average localization error of 2.73 m and robust communication rates. The proposed framework offers a practical solution for resource-constrained aerial ILAC networks.



INVITED TALK | 16:20-16:40

Semantic Communication for Future Wireless Connectivity

Yao Sun, University of Electronic Science and Technology of China, China

Abstract: Semantic communication (SemCom) has recently emerged as a transformative paradigm, prioritizing accurate reception of message meaning over mere bits. The core concept is to empower wireless transceivers with reasoning and causality. While tremendous effort has been put into intelligent transceiver design for semantic communication, this talk will focus on the networking challenges of this new communication paradigm. The talk will first investigate the potential channel capacity model for semantic communication, and then a few





challenges will be discussed along with several technical works to address these challenges. Finally, some future research directions will be explored.

INVITED TALK | 16:40-17:00

From Pixels to Meaning: Low-Latency Video Semantic Communications for Remote Driving

Celimuge Wu, The University of Electro-Communications, Japan

Abstract: The explosive growth of multimedia data, connected devices, and real-time intelligent applications is creating unprecedented challenges for existing communication infrastructures. Traditional systems that transmit raw or compressed data often suffer from high latency and inefficient use of bandwidth, particularly in delay-sensitive applications such as remote driving. Semantic communications offer a promising paradigm shift by focusing on conveying meaningful information rather than transmitting data itself.



This talk introduces a novel low-latency video semantic communication framework for remote driving, based on an asymmetric encoder–decoder architecture. The framework extracts and transmits only essential semantic features, while generative AI at the receiver reconstructs high-quality, semantically consistent video. We also present a prototype implementation that integrates semantic feature extraction, efficient transmission, and AI-based video reconstruction, demonstrating the practical feasibility of the proposed approach. The talk further discusses the broader vision of integrating semantic communications, generative AI, and intelligent networking toward task-oriented, meaning-aware, and resource-efficient 6G systems, highlighting key challenges and future research opportunities.

TALK DETAILS

Time	Presentation
	Paper Title: Decoupled Prior Selection and Complementary Fusion for Automatic Modulation Classification Author(s): Zuotao Zheng, Xiaoling Hu, Qin Tao, Fengxian Guo, Mugen Peng Presenter: Zuotao Zheng, Beijing University of Posts and Telecommunications, China
17:00-17:15 ET3363	Abstract: Explicit physical and statistical priors can effectively complement deep automatic modulation classification (AMC) models. However, a universally fixed handcrafted combination often fails to adapt to diverse modulation scenarios and acquisition conditions. To address this limitation, this paper proposes a novel AMC framework termed decoupled prior selection and complementary fusion (DPS-CF). Specifically, a multi-criteria selector synthesizes sparse logistic regression, ExtraTrees feature importance, and mutual information to distill a compact prior subset from a comprehensive candidate pool. The retained priors are mapped via



a projection network, modulated by a sample-wise scalar gating mechanism, and fused with a frozen CNN-LSTM deep representation. Evaluated on a custom-collected 13-class USRP over-the-air dataset, DPS-CF achieves an overall accuracy of 82.14% across SNRs from -10 dB to 20 dB and 79.90% within the -10 dB to 10 dB interval, outperforming the HKDD baseline by 1.82 and 2.98 percentage points, respectively. Furthermore, on the public RML2018.01A benchmark, DPS-CF surpasses MCLDNN by 0.77 and 0.88 percentage points across the corresponding two evaluation ranges. Collectively, these results demonstrate superior classification performance and consistent effectiveness on a custom-collected over-the-air dataset and a public AMC benchmark.

Paper Title: Semantic Content Delivery Network for Intent-Oriented Human-Centric Video Streaming

Author(s): Yushuo Feng, Peiwen Jiang, Chao-Kai Wen, Xiao Li, Shi Jin

Presenter: Yushuo Feng, Southeast University, China

17:15-17:30
ET3371

Abstract: Content delivery networks (CDNs) reduce video delivery latency by caching popular clips at edge nodes. However, the rapid growth of video traffic and the increasing diversity of user intents, such as requirements for facial fidelity, motion accuracy, and visual quality, make conventional clip-level caching and delivery inefficient under limited cache and bandwidth resources. In this work, we propose a generative foundation model (GFM)-assisted semantic content delivery network (SCDN) for intent-oriented human-centric video streaming. Instead of full clips, SCDN caches and delivers lightweight semantic tokens that are selected according to user intents and reused across clips sharing semantic content, such as the same identity or background. At the receiver, the GFM serves as a generative knowledge base to reconstruct the requested video from the fetched tokens. This design enables intent-aware semantic delivery and cross-clip token reuse, improving both caching and transmission efficiency. Simulation results show that, compared with the fixed-rate H.265-based CDN baseline under the same cache and bandwidth constraints, SCDN improves the average edge intent hit ratio (AEHR) by 57.5% in cache-limited multi-user scenarios and by 74.6% in bandwidth-constrained scenarios.

Paper Title: Distributed Precoding for Cell-Free AI-RAN: A PGD-Based Approach

Author(s): Xiaotong Yang, Jianhua Tang, Fangjiong Chen

Presenter: Xiaotong Yang, South China University of Technology, China

17:30-17:45
ET4450

Abstract: In cell-free massive multiple-input multiple-output (MIMO), coherent joint transmission couples the precoders of distributed access points (APs) under per-AP power constraints. Artificial intelligence radio access networks (AI-RAN) bring GPU-accelerated computing into the RAN, enabling more computationally intensive precoding within the real-time processing path. Nevertheless, distributed precoding still demands computationally efficient updates and controlled



fronthaul coordination. Existing provably convergent distributed weighted minimum mean square error (WMMSE) methods rely on matrix-inversion-based precoder updates and iterative information exchange until convergence. We first develop distributed projected gradient descent (D-PGD), which replaces the matrix inversion in the precoder update with projected gradient steps. A fully distributed step-size rule guarantees convergence to a stationary point. We then propose unfolded distributed PGD (UD-PGD), a two-stage deep-unfolded network with a coordination budget fixed in advance. Its first stage performs exchange-free local updates guided by learned biases, while its second stage uses a prescribed number of AP--central processing unit (CPU) round trips to incorporate global information. Simulation results show that UD-PGD achieves 97.3\% of the converged centralized WMMSE rate within six deterministic coordination rounds, demonstrating effective distributed precoding under a strictly bounded fronthaul budget.

Paper Title: Channel-Prediction-Based Semantic MIMO Image Transmission under CSI Aging

Author(s): Zekai Liu, Jinglin Zhang, Min Hao, Peiyao Zhong, Wenjun Xu

Presenter: Zekai Liu, Beijing University of Posts and Telecommunications, China

17:45-18:00
ET4505

Abstract: High-mobility image transmission is challenged by transmitter-side channel state information (CSI) aging, which causes the transmission strategy designed at the transmitter to mismatch the actual multiple-input multiple-output (MIMO) channel. Existing MIMO semantic communication and joint source – channel coding (JSCC) schemes generally do not jointly account for future spatial-channel conditions and content-dependent transmission requirements under practical hybrid-precoding constraints. To address this issue, this paper proposes a prediction-based semantic MIMO framework that predicts the future complex MIMO channel from historical CSI and jointly exploits the predicted CSI and image latent features for stream-wise transmission adaptation. Specifically, the predicted CSI characterizes the expected spatial-channel conditions, while the latent features provide content-dependent information for content-aware precoding and power allocation across spatial streams; the resulting transmission is further realized through hybrid precoding with constant-modulus and quantized-phase constraints on the analog precoder. Experimental results show that the proposed framework improves image reconstruction under CSI aging across different mobility speeds, achieving up to a 2.25 dB PSNR gain over existing MIMO JSCC baselines.

18:00-18:15
ET3379

Paper Title: GraphJSCR: Graph Reinforcement Learning for Joint Routing and Semantic-Budget Adaptation in Multi-Hop LEO Networks

Author(s): Hong Zeng, Jiangtao Luo, Yongyi Ran

Presenter: Hong Zeng, Chongqing University of Posts and Telecommunications, China



Abstract: Multi-hop semantic image delivery over low Earth orbit (LEO) inter-satellite networks couples routing, queueing, semantic payload size, and optional relay-side processing. This paper presents GraphJSCR, a graph-reinforcement-learning framework that coordinates next-hop selection, source semantic-budget selection, and relay-side semantic adaptation using a local one-hop GAT subgraph augmented with compact two-hop summaries. The constellation is represented as a time-varying directed graph, and each packet-holding node executes a shared Proximal Policy Optimization policy. Direct forwarding is modeled as digital store-and-forward without modifying the semantic representation; when relay processing is enabled, a feature-domain operator adapts the semantic payload while accounting for the associated processing latency. GraphJSCR is evaluated in ns-3 on a 70-satellite Walker-like pure inter-satellite-link scenario using a SwinJSCC-based image codec. Across the evaluated topology, channel, and traffic settings, GraphJSCR achieves a favorable semantic-quality--delay--reliability tradeoff relative to the selected semantic-transmission and learning-based routing baselines, especially at low signal-to-noise ratios and increased offered-session load. These results demonstrate proof-of-concept effectiveness within the evaluated abstraction.

TECHNICAL SESSIONS >>>

TS14: Communication and Information Security

Session Chair: Youyang Xiang, Institute of Electronic Engineering, China Academy of Engineering Physics, China

Time 16:00-18:00 | Oct. 17, 2026

Venue Meeting Room 6

INVITED TALK | 16:00-16:20

Discrete-State Continuous Variable Quantum Communication

Yongmin Li, Shanxi University, China



Abstract: Quantum key distribution (QKD) exploits fundamental principles of quantum mechanics to enable information-theoretically secure secret-key sharing between two parties. Discrete-modulation continuous-variable QKD protocols are compatible with modern coherent optical communication technologies and devices. In this talk, I will present our recent progress in discrete-state continuous-variable quantum communication, including: 1) Passive discrete-state continuous variable QKD; 2) Discrete-state continuous variable QKD with integrated silicon photonic transmitter and receiver; 3) Information reconciliation for hard-decision phase shift keying discrete modulation continuous-variable QKD; 4) semi-device independent quantum random number generator.

INVITED TALK | 16:20-16:40

Prototype Surgery: Tailoring Neural Prototypes via Soft Labels for Efficient Machine Unlearning

Gaoyang Liu, Huazhong University of Science and Technology, China



Abstract: The rapid advancements and widespread application of deep neural networks (DNNs), coupled with their reliance on sensitive and private data, have sparked growing concerns regarding data privacy and the "right to be forgotten". To address these concerns, machine unlearning has been proposed to efficiently eliminate the influence of specific training data from trained DNNs. However, existing machine unlearning methods struggle with the large number of parameters in trained DNNs, which lead to slow execution and high memory consumption, making them impractical for large-scale models. In this paper, we shift our focus to the small set of weights in the final classification layer of DNNs, which are defined as "prototypes" for different classes. Our key observation is that the prototype associated with the unlearned training data undergoes a significant shift, whereas prototypes of unrelated classes exhibit only minor changes when comparing the prototypes of original and retrained models. Based on this observation, we propose a novel machine unlearning approach that efficiently achieves machine unlearning by directly adjusting the prototypes of



DNNs. We first introduce Naive Prototype Surgery (Naive PS), a fast and simplified method that uses a closed-form solution to approximate unlearning effect by directly adjusting the prototype associated with the unlearned data. Next, we propose Prototype Surgery (PS), which incorporates soft label information to fine-tune the prototypes of all classes, to achieve a more effective unlearning. Both methods achieve data unlearning by only modifying the prototypes in the DNNs, thus avoiding the challenges posed by the large number of model parameters. Extensive experiments on four datasets demonstrate that our methods significantly accelerate the unlearning process while achieving comparable results to five existing methods in terms of both unlearning performance and privacy guarantee.

INVITED TALK | 16:40-17:00

LLM-Empowered Modern Software Security Testing

Gang Yang, Information Support Force Engineering University, China



Abstract: Large language models (LLMs) are rapidly changing modern software security testing. This talk gives a general introduction to LLM-empowered fuzzing, with a particular focus on LibFuzzer-based techniques. It explores how LLMs can support seed generation, input mutation, and test-case synthesis, thereby improving coverage-guided fuzzing workflows. The talk also discusses practical opportunities and challenges, such as prompt design, output validity, hallucination, and evaluation. Finally, it highlights how LLM-driven fuzzing can complement traditional approaches and help discover software vulnerabilities more efficiently. No deep prior knowledge is required.

TALK DETAILS

Time	Presentation
17:00-17:15 ET2206	Paper Title: Secure Task Offloading in UAV-MEC: ISAC-Assisted Eavesdropper Sensing and Cooperative Jamming Author(s): He Li, Shie Wu, Wenqing Wu, Jiahui Chen Presenter: Shie Wu, Yantai University, China; Wenqing Wu, Yantai University, China; Jiahui Chen, Yantai University, China Abstract: In unmanned aerial vehicle-assisted mobile edge computing (UAV-MEC) systems, the broadcast nature of air-to-ground links renders offloaded data vulnerable to eavesdropping. Integrated sensing and communication (ISAC) enables UAVs to sense eavesdropper state information for directional cooperative jamming. Specifically, since sensing-time allocation affects both eavesdropper sensing accuracy and secure offloading efficiency, it should be adaptively optimized according to the UAV trajectory. Therefore, this paper proposes an ISAC-assisted UAV-MEC system with cooperative jamming, in which a legitimate UAV provides MEC services and senses eavesdroppers, while a jamming UAV transmits



directional jamming signals based on sensing feedback. The problem of maximizing the total secure task offloading amount is formulated as a mixed-integer non-convex optimization problem. To solve the problem, we design a block coordinate descent–successive convex approximation (BCD-SCA) algorithm to jointly optimize user scheduling, users' transmit power, sensing-time allocation, and UAV trajectory. Simulation results indicate that the proposed algorithm significantly improves the total secure task offloading amount compared with benchmark schemes.

Paper Title: Recoverability Asymmetric Nonlinear Inverse Recovery Relaying for Physical Layer Security in Integrated Space-Air-Ground Networks

Author(s): Youyang Xiang, Zhuo Zhang, Rui Qiu, Xianglu Li, Chao Zeng, Xianhua Shi, Nanzhou Hu, Jie Tian

Presenter: Youyang Xiang, Institute of Electronic Engineering, China Academy of Engineering Physics, China

17:15-17:30
ET2151

Abstract: Integrated space–air–ground networks (ISAGNs) support emergency connectivity, sensing backhaul, infrastructure monitoring, and remote Internet of Things (IoT) access. These links may carry confidential sensing or control data, while nonterrestrial relays expose forwarded waveforms over wide spatial regions. Physical layer security (PLS) in this setting depends on the timing and coefficient consistency needed for waveform recovery. This paper studies an ISAGN with one unmanned aerial vehicle (UAV) source, trusted low Earth orbit (LEO) relays, one legitimate ground receiver, and passive eavesdroppers. The source applies a bounded odd nonlinear map, and the relays forward assigned odd-order terms of a truncated inverse series. Delay compensation, relay coefficients, and artificial noise (AN) are matched to the legitimate receiver. Power normalization, synchronization, channel knowledge, and eavesdropper processing assumptions are stated explicitly. The recovery error and hard-decision secrecy throughput are analyzed. Simulations show location-dependent recovery separation under reliable first-hop relay decisions.

Paper Title: ISAC Network-Side Label-Free UAV 3D Localization via Physics-Informed CSI Spatial Representation Learning

Author(s): Fanhai Xu, Jianzhao Zhang, Yongxiang Liu, Junquan Deng

Presenter: Junquan Deng, National University of Defense Technology, China

17:30-17:45
ET3289

Abstract: Integrated sensing and communication (ISAC) enables network-side localization by reusing channel state information (CSI) obtained from standard uplink transmissions, eliminating the need for dedicated sensing infrastructure. However, acquiring ground-truth position labels for supervised training is often infeasible in practical deployments, particularly for mobile targets such as unmanned aerial vehicles (UAVs). In this paper, we propose an ISAC-enabled label-free 3D localization framework that learns spatial representations from multi-BS



CSI via an encoder-LSTM architecture and recovers absolute 3D coordinates considering known infrastructure network geometry and UAV kinetic constraints. The framework fuses angle-delay profile (ADP) and Doppler features, and constrains the output via BS received-power ranking, inverse-distance profile matching, and UAV kinematic priors without utilizing ground-truth position labels. Simulations across 100 UAV trajectories in a 200m×200m area with 16 multi-height BSs yield a 3D RMSE of 17.687 m for the proposed framework, with RMSE reduced by a factor of 2.2 versus supervised fingerprinting and over a factor of 4.3 versus calibration-dependent CC baselines.

Paper Title: Multi-Core Optical Fiber Digital Twin System Based on GNN-PINN

Author(s): Ruoting Liu, Xin Li, Feiyang Ruan, Shubo Qi, Tenglin Gao, Shanguo Huang

Presenter: Ruoting Liu, Beijing University of Posts and Telecommunications, China

17:45-18:00
ET4512

Abstract: Accurate and efficient modeling of pulse propagation in multi-core fibers (MCFs) is essential for high-capacity space-division multiplexing transmission systems, yet conventional numerical methods such as the Split-Step Fourier Method (SSFM) face high computational cost under complex inter-core coupling dynamics, especially across multiple cores and long propagation distances. To address this, this paper proposes a graph neural network-based physics-informed neural network (GNN-PINN) that encodes inter-core coupling relationships as a graph, enabling graph convolutional layers to naturally capture energy exchange between adjacent cores. Experiments across 9 configurations (three coupling strengths, three pulse types—Gaussian, Sech, and super-Gaussian) demonstrate excellent agreement with SSFM while achieving superior computational efficiency and robustness. This work provides a promising data-driven approach for the rapid and accurate simulation of nonlinear pulse dynamics in MCF-based transmission systems.

TECHNICAL SESSIONS >>>

TS15: Wireless Edge Computing, Caching, and Distributed Intelligence

Session Chair: Jie Tian, Shandong Normal University, China

Time 16:00-18:00 | Oct. 17, 2026

Venue Meeting Room 7

INVITED TALK | 16:00-16:20

Reliability-Aware Task Offloading and Resource Allocation in UAV-Assisted MEC Networks

Jie Tian, Shandong Normal University, China



Abstract: Mobile edge computing (MEC) can support delaysensitive and computation-intensive services at the network edge. In infrastructure-limited Internet of Things (IoT) scenarios, unmanned aerial vehicles (UAVs) can be deployed on demand to provide communication and computing services. Existing studies often adopt idealized link assumptions and overlook the impact of insufficient air-ground link reliability, whereas low link reliability may cause task failures and waste communication and computing resources. To address this issue, this paper jointly optimizes the task offloading ratio, uplink bandwidth, and UAV computing resources, introduces heterogeneous task utilities, and defines a long-term system gain to balance task utility, energy consumption, and upload reliability. To this end, a Reliability-Guided Proximal Policy Optimization (RFG-PPO) algorithm is proposed, together with a rule-based UAV trajectory update mechanism driven by task priority and urgency. Simulation results show that the proposed RFG-PPO maintains high task completion and upload success under different user scales, achieves higher system utility in low- and medium-load scenarios, and keeps task latency low.

INVITED TALK | 16:20-16:40

Learning-Driven Edge Caching and Resource Optimization for Intelligent Wireless Networks

Dongyang Li, China University of Petroleum (East China), China



Abstract: The rapid growth of mobile applications and data-intensive services has placed increasing demands on the latency, efficiency, and adaptability of wireless networks. Edge caching provides an effective means of alleviating network congestion and reducing content delivery latency by bringing popular content closer to users. However, realizing intelligent edge caching requires not only accurate understanding of users' dynamic content demands, but also effective coordination between caching decisions and wireless resource allocation. This talk presents recent studies on learning-driven edge caching and resource optimization in wireless networks. By leveraging user behavior, contextual information, and



data-driven learning, proactive caching mechanisms are developed to capture evolving content preferences and support adaptive content placement and replacement. Building upon this demand-aware perspective, learning-based joint optimization is further explored to coordinate edge content caching with wireless resource allocation, enabling efficient and timely network decision-making. These studies establish a progressive framework from learning what users are likely to request to intelligently determining how network resources should be allocated to serve those requests. The presented research highlights the potential of learning-driven approaches to enhance the intelligence, adaptability, and efficiency of edge caching and resource management in dynamic wireless networks.

INVITED TALK | 16:40-17:00

Joint Resource Allocation for ISCC Empowered Low Altitude Networks

Xiaotian Zhou, Shandong University, China



Abstract: Low-altitude networks are emerging as an important infrastructure for future wireless systems, which is expected to provide flexible yet multi-dimensional services to users, such as sensing, computation and communications. The performance of low-altitude network is therefore significantly affected by the jointly coordination of resource is the multi-dimensional domain. In this talk, we introduce our recent works on the jointly resource allocation in the context of Integrated Sensing Computation and Communication empowered low altitude networks. We first discuss the learning based predictive bidirectional beamforming, which exploits historical ISAC echoes to track UAV motion and maintain beam alignment to facilitate the ground-air communication performance. We then show how mobility-aware trajectory and communication resource optimization enables multiple UAVs to adapt their coverage to moving users and time-varying service hotspots. We further present queue-aware sensing, communication, and computing resource allocation in space-air-ground integrated networks with LEO-assisted task processing.

TALK DETAILS

Time	Presentation
17:00-17:15 ET3378	Paper Title: AirMoE: Energy-Aware Joint Expert Selection and Receive Beamforming for Over-the-Air MoE Inference at the Wireless Edge Author(s): Jing Zhou, Siyuan Zhou, Zihan Gao, Bin Tang Presenter: Jing Zhou, Hohai University, China Abstract: Wireless distributed mixture-of-experts (MoE) inference requires selected edge devices to repeatedly upload high-dimensional expert outputs. We propose AirMoE, which exploits over-the-air computation (AirComp) to aggregate the routed expert outputs directly, and AirMoE-JESB, an energy-aware joint expert-selection and receive-beamforming method. The design limits deviation from the



pretrained router while enforcing per-device peak power and per-aggregation mean-squared-error (MSE) constraints. A necessary power condition safely removes impossible expert sets, and a computation-and-communication energy lower bound retains only a short list for successive convex approximation (SCA). End-to-end Mixtral-8 $\times$ 7B-Instruct-v0.1 experiments on four benchmarks show comparable task accuracy to digital Top-2 routing while reducing the modeled edge energy by 95.51%. JESB further reduces energy by 2.82% over fixed-routing AirComp and by 16.72% over a Greedy-SCA baseline. With shortlist width three, its mean energy gap to a full-enumeration SCA reference is 1.07% with a $21.89\times$ offline optimization speedup. At 15 dBm, JESB also recovers 39 layer--token decisions that fixed Top-2 loses specifically to the peak-power constraint.

Paper Title: Toward Mobility-Aware Task Offloading Based on Node Collaboration in the End-Edge-Cloud Environment

Author(s): Shuai Ren, Liangjun Jiang, Jiande Sun, Jian Wang, Xichun Lu, Chuanfen Feng

Presenter: Chuanfen Feng, Shandong Normal University, China

**17:15-17:30
ET3341**

Abstract: Integrating device ends (DEs), Multi-access edge computing servers (MECs) and cloud servers (CSs) into the collaborative computing architecture of End-Edge-Cloud nodes can effectively improve resource utilization. According to the visibility and reachability of cloud servers to DEs, End-Edge-Cloud architecture has parallel and serial computing architectures. However, both the parallel architecture and the serial architecture do not give full play to the advantages and synergistic effects of the End-Edge-Cloud nodes. In this paper, we construct a hybrid architecture based on End-Edge-Cloud node cooperation in mobile scenarios, and study joint optimization of task offloading and migration. The hybrid architecture absorbs the advantages of parallel architecture and serial architecture, making it possible to offload tasks to MECs and CSs in parallel, and to CSs through MECs. The simulation results show that compared with the serial architecture and parallel architecture, the system benefit of the hybrid architecture is increased by 3% and 30% on average, and the average system delay is reduced by 7% and 45%, respectively in the multi-user scenario.

**17:30-17:45
ET3296**

Paper Title: Hierarchical Optimization of UAV Trajectory Planning and Resource Allocation for UAV-Assisted MEC Networks

Author(s): Xiaomeng Dong, Dongyang Li, Jie Tian, Leiyu Wang

Presenter: Xiaomeng Dong, China University of Petroleum (East China), China

Abstract: In UAV-assisted mobile edge computing (MEC) networks, efficient coordination between UAV trajectory planning and communication-computing resource allocation is essential for reducing the overall system cost. However, the strong coupling between these two optimization components makes the problem



highly challenging. To address this issue, this paper proposes a hierarchical optimization framework for coordinated UAV trajectory planning and communication-computing resource allocation. Specifically, the proposed framework consists of a trajectory-planning layer and a communication-computing resource allocation layer. The trajectory-planning layer first partitions users into service clusters through a surrogate clustering objective that jointly considers service cost, load balancing, and flight efficiency. Based on the obtained user clusters, cluster-specific hovering locations are determined, and ant colony optimization (ACO) together with local hover-point refinement is employed to optimize the cluster visiting order and construct an efficient UAV trajectory. Given the planned trajectory, the resource-allocation layer adopts a block coordinate descent (BCD) algorithm to iteratively optimize user transmit power, continuous task offloading ratios, and UAV computing resource allocation. Furthermore, a trajectory-aware feedback mechanism is developed to exchange optimization information between the two layers, enabling progressive refinement of the UAV trajectory and communication-computing resource allocation. Simulation results demonstrate that the proposed framework consistently outperforms benchmark schemes, achieving up to 22.3% reduction in overall system cost.

Paper Title: Joint Optimization of Aggregation and Communication Resource for UAV-Assisted Asynchronous Federated Learning

Author(s): Hailong Zhu, Muyu Mei, Li Feng, Mingwu Yao

Presenter: Muyu Mei, Jiangsu University, China

17:45-18:00
ET4435

Abstract: In this work, we study the challenges of model training in unmanned aerial vehicle (UAV)-assisted asynchronous federated learning (AFL), where data heterogeneity, wireless channel variability, and constrained resource degrade the network performance. Combined with a deep reinforcement learning (DRL) algorithm, namely softmax deep double deterministic policy gradient (SD3) and a gradient reference mechanism, we propose AFL-SD3, a novel staleness-aware framework designed to enhance the reliability of UAV-assisted AFL. Under this framework, the optimization problem of communication resource allocation and aggregation is formulated as a Markov decision process, where the leader UAV acts as an agent trained by the SD3 algorithm. Relevant experiments demonstrate that AFL-SD3 achieves best performance compared with the other commonly-used methods. These results confirm the efficiency of our framework for enabling reliable UAV-assisted AFL.

TECHNICAL SESSIONS

TS16: Aerial Communications, UAV Communications, Vehicular Networks (II)

Session Chair: Yan Zhang, Beijing Institute of Technology, China

Time 16:00-18:05 | Oct. 17, 2026

Venue Board Room

INVITED TALK | 16:00-16:20

An Integrated Dual-Fingerprint Authentication and Key Generation Scheme for HAPS Communications

Yan Zhang, Beijing Institute of Technology, China

Abstract: High-altitude platform station (HAPS) networks provide wide-area access from an aerial platform to mobile and heterogeneous ground terminals. Physical-layer security in HAPS communications faces both access and transmission threats. Before encrypted communication can be established, the receiver should first authenticate the access terminal and reject illegal or unreliable links. However, existing physical-layer authentication (PLA) mainly protects access, while standalone physical-layer key generation (PLKG) may still be triggered by unauthorized users and waste key resources. To bridge authentication and secure transmission, an integrated mechanism is proposed to jointly exploit channel state information (CSI) and radio-frequency fingerprinting (RFF) for authentication, and then to reuse authenticated channel features to generate physical-layer keys for encrypted communication. A fusion classifier based on CSI distance, RFF similarity and margin features distinguishes legal access from illegal access attempts. Only links passing authentication are allowed to enter quantization and reconciliation, so that key generation is conditioned on access legitimacy. Simulation results show that the proposed fusion method achieves lower equal error rate than single-fingerprint baselines. Compared with standalone PLKG, the authenticated design reduces the mean unauthorized key-trigger exposure to 8.58% while retaining 0.3156 bit/sample authenticated key availability. The generated keys pass the NIST randomness tests.



TALK DETAILS

Time	Presentation
16:20-16:35 ET1064	Paper Title: Leveraging World Models for Robust Spatial-Temporal Semantic Communication in FANETs Author(s): Lingna Xiao, Chuanjiang Chen, Yi Liu, Zhiyong Shi, Zhongyun Chen, Chengjun Li Presenter: Lingna Xiao, Information Support Force Engineering University, China



Abstract: Flying Ad Hoc Networks (FANETs) enable Unmanned Aerial Vehicle (UAV) swarms to communicate dynamically in a decentralized manner. However, traditional bit-level communication paradigms struggle under harsh channel conditions with low signal-to-noise ratios (SNR), frequent interference, and rapid topology changes. This paper proposes LeWM-SC, a novel Learning World Model based Spatial-Temporal Semantic Communication framework for FANETs. LeWM-SC leverages pre-trained world model representations to achieve robust semantic encoding, and integrates spatial-temporal graph neural networks (GNNs) with a Confidence Decay mechanism to exploit spatial correlations among UAVs and temporal continuity in swarm dynamics. Experiments on realistic swarm communication scenarios demonstrate three key contributions: (1) World model semantic compression achieves $196\times$ compression with 99.5% bandwidth savings, (2) pre-trained world model representations provide $16\text{--}30\times$ better robustness against channel noise compared to vanilla semantic encoders at $\text{SNR} = 0\text{ dB}$, (3) spatial-temporal GNN prediction with residual transmission provides an additional 72.8% bandwidth saving, further improved to 96.6% via the Confidence Decay mechanism. LeWM-SC represents a promising new paradigm for robust and efficient communication for Autonomous Mobile Ad Hoc Network.

Paper Title: Multi-AAV Assisted Priority-Aware Laser Charging for Emergency Communications

Author(s): Chenyi Hu, Xilong Liu, Xinying Guo, Chenglong Wang

Presenter: Chenyi Hu, Yunnan University, China

16:35-16:50
ET2154

Abstract: Autonomous aerial vehicles (AAVs) are able to provide flexible relay services for emergency communications when terrestrial communication infrastructure is unavailable. However, the endurance of AAVs remains a key challenge due to their limited onboard energy. Insufficient energy supply may cause relay interruption, especially in complex-terrain areas with high backhauling demand. In this paper, we investigate a single base-station emergency communication framework, where a laser emitter is adopted for directional wireless charging. Under the single-emitter constraint, a charging priority scheduling problem is formulated with considering the residual energy, relay demand, charging feasibility, and radio frequency relay requirements. Then, a priority-aware charging algorithm is heuristically developed to determine the AAV charging order according to the user-association, energy urgency, and relay demand. Simulation results demonstrate that the proposed algorithm improves AAVs' energy stability and supports more steady emergency relay.

16:50-17:05
ET2220

Paper Title: Dynamic Heterogeneous Collaborative Learning for Semantic Communication in Low-Altitude Economy Networks

Author(s): Jianshi Chen, Pengchao Han, Junliang Ye, Yuna Jiang, Yi Fang, Xiaohu Ge

Presenter: Pengchao Han, Guangdong University of Technology, China



Abstract: Semantic communication enables unmanned aerial vehicles (UAVs) in low-altitude economy networks (LAENets) to transmit compact task-oriented representations over bandwidth-limited and time-varying air-to-ground links. To train generalizable semantic models without sharing raw data, collaborative learning among UAVs is needed to leverage distributed private data. However, efficient collaborative semantic training in mobile LAENets is strongly affected by dynamic UAV-BS association, since the associated BS determines not only the wireless access link but also the training cluster and compatible encoder architecture. This paper investigates dynamic UAV-BS association for heterogeneous collaborative semantic learning in LAENets. We first introduce a hierarchical collaborative learning (HCL) framework to support scalable semantic training with heterogeneous UAV-side encoders. We then formulate a dynamic UAV-BS association problem that jointly considers HCL training delay, link stability, UAV reassociation cost, encoder handover cost, encoder compatibility, and BS power consumption. To solve this problem efficiently, we develop a Lagrangian Decomposition with Recovery and Refinement (LD-RR) algorithm. Experimental results show that LD-RR becomes increasingly computationally competitive with the optimal solver as the network scale increases and outperforms heuristic baselines in both overall objective and HCL performance.

Paper Title: Online Joint Admission, Resource Allocation, and Trajectory Design for Energy Minimization in Solar-Powered UAV-MEC Networks

Author(s): Youquan Zhang, Xiangyang Peng, Suzhi Bi, Xian Li, Xiao-Hui Lin

Presenter: Youquan Zhang, Shenzhen University, China

17:05-17:20
ET2145

Abstract: This paper studies a solar-powered uncrewed aerial vehicle (UAV)-enabled mobile edge computing (MEC) sensor network, where a rotary-wing UAV assists multiple energy-constrained sensors with stochastic data admission, local computing, and task offloading. We minimize the long-term weighted ground-node energy consumption while ensuring queue stability, average admission requirements, and sustainable UAV operation. To handle the coupling among sensing traffic, computation and offloading decisions, solar harvesting, propulsion energy, and three-dimensional UAV mobility, we formulate a long-term stochastic optimization problem and design a Lyapunov drift-plus-penalty-based online algorithm. The per-slot problem is decomposed into closed-form admission control, convex communication/computation resource allocation, and successive convex approximation (SCA)-based trajectory and altitude optimization. Simulations show that the proposed method achieves data queue stability at sensors and reduces their average energy consumption by 33.5% compared to representative benchmarks.

17:20-17:35
ET3323

Paper Title: Lyapunov-Based Joint Optimization for Vehicle-UAV Cooperation in Occluded Scenarios

Author(s): Ao Lv, Xiaoxuan Wang, Xuehan Li, Ci Liang, Wei Chen, Huasong Jin



Presenter: Ao Lv, Beijing Jiaotong University, China

Abstract: Unmanned aerial vehicles (UAVs) enhance connectivity and service coverage in intelligent transportation systems (ITS) and Internet of Vehicles (IoV) networks, but physical blockage in urban and tunnel environments degrades direct line-of-sight (LoS) links. We propose a vehicle-UAV cooperative framework in which unoccluded vehicles relay data for occluded vehicles according to spatial distributions and link conditions. A Lyapunov-based dual-timescale algorithm jointly optimizes relay selection, UAV trajectory, and UAV transmit power to minimize the maximum bidirectional end-to-end delay. By modeling queue dynamics and link-interruption penalties, the long-term problem with time-average constraints is transformed into a tractable per-slot problem. Simulation results show that the proposed algorithm reduces average system delay and improves delay fairness across links compared with baseline algorithms.

Paper Title: Queue-Aware Admission and Scheduling for UAV-Assisted Hierarchical Federated Learning in Urban IoT Hotspots

Author(s): Tongzhou Yang, Qihao Li, Zhisheng Yin, Zhuang Ling, Fengye Hu

Presenter: Tongzhou Yang, Jilin University, China

**17:35-17:50
ET4451**

Abstract: In this paper, we propose a novel queue-aware admission and scheduling (QAAS) scheme for efficient federated learning (FL) over UAV-assisted urban IoT hotspots with limited aerial forwarding resources. To alleviate the radio-access burden at heavily loaded base stations (BSs), UAVs serve as regional collectors to aggregate device access and forward model updates to neighboring edge-enabled BSs. To further distribute edge-computing workloads and cope with heterogeneous local data, class-specific aggregation services are placed at different BSs, where same-class updates are aggregated before inter-class model fusion. On the network side, model updates of different classes are multiplexed in finite-capacity FCFS UAV queues and experience heterogeneous UAV-to-BS link availabilities, causing severe head-of-line (HoL) blocking under the shared aerial FL resource. We characterize the multi-queue stability region and derive a tractable convex inner approximation by introducing queue-level normalized service demands. Based on this characterization, QAAS jointly regulates model-update admission and UAV scheduling according to queue states and instantaneous HoL service availability. A Lyapunov-based analysis establishes queue stability and long-term utility guarantees. Simulation results demonstrate that QAAS mitigates HoL blocking, improves update delivery, and reduces FL-round completion time, while class-aware hierarchical aggregation enhances learning performance under heterogeneous data.

**17:50-18:05
ET903**

Paper Title: Learning Degradation Sensitivity-Guided Privacy Allocation in Differentially Private Federated Learning



Author(s): Wubin Rong, Jianhong Zhou, Shiyi Tang, and Mi Li

Presenter: Wubin Rong, Xihua University, China

Abstract: Differentially private federated learning (DP-FL) protects training data by perturbing model updates, but a fixed privacy budget may be inefficiently distributed across training rounds and model parameters. This paper proposes FedDARC, an LDS-guided privacy-resource allocation framework for DP-FL. We define Learning Degradation Sensitivity (LDS) by combining noise-degradation sensitivity, learning gain, and generalization reliability to characterize the relative importance of each training round. Based on LDS, we derive a cross-round budget allocation rule and formulate parameter-level noise allocation as a minimax optimization problem under a fixed privacy-cost constraint, yielding a Fisher-guided variance allocation. FedDARC estimates privacy demand online, smooths round-level allocation, adapts coordinate-wise Gaussian noise using normalized inverse-Fisher shares, and tracks cumulative privacy loss with Rényi differential privacy accounting. Experiments on CIFAR-10 show that FedDARC achieves the highest mean test accuracy among the evaluated baselines at privacy budgets $\epsilon = 4$ and $\epsilon = 8$. Further results show that the online scheduler assigns larger allocation scales to high-LDS rounds, while Fisher-guided allocation reduces empirical learning degradation relative to uniform and gradient-based allocation. These findings support the effectiveness of LDS-guided privacy allocation under the evaluated settings.

TECHNICAL SESSIONS >>>

TS17: Communication and Information Theory (II)

Session Chair: Xiaoqian Li, The University of Electronic Science and Technology of China

Time 13:30-15:10 | Oct. 18, 2026

Venue Meeting Room 1

INVITED TALK | 13:30-13:50

Memory-Augmented Reverse Distillation for Continuous Spectrum Anomaly Detection

Tao Zhang, National University of Defense Technology, China

Abstract: Effective spectrum anomaly detection (SAD) is of paramount importance for maintaining communication security and spectrum utilization efficiency. Most existing research still focuses on training dedicated anomaly detection models for specific electromagnetic scenarios. However, developing such environment-specific SAD models may incur a high computational cost, restricting their practical applicability. To address the above challenges, we investigate a continuous learning environment. Specifically, we introduce the Memory-Augmented Reverse Distillation for Continual Learning (MARD-CL), which is an innovative SAD method that integrates reverse distillation (RD) and memory enhancement module (MEM). Moreover, in order to enable the method to continuously learn in a series of electromagnetic environments, we perform the dual pooling distillation on the reconstructed data from student model and fusion feature from feature fusion module, respectively. The dual pooling distillation prevents the model from forgetting previously learned knowledge when learning new scenarios data, thereby solving the problem of catastrophic forgetting. Experiments have confirmed that proposed SAD method outperforms the existing methods.



INVITED TALK | 13:50-14:10

Joint Optimization of Sensing, Communication and Computation in Wireless Communication Networks

Xiaoqian Li, The University of Electronic Science and Technology of China

Abstract: Agentic AI (AAI), with its capability of autonomous sensing, decision-making, and continuous learning, is regarded as a key enabler for realizing endogenous intelligence in 6G. Multi-agent distributed collaborative learning in wireless networks serves as the core technical approach to support the continuous model updating and autonomous decision-making of AAI. However, in existing distributed collaborative learning frameworks, the sensing, training, and transmission processes, along with their associated resources, are scheduled independently. This decoupling significantly hinders the closed-loop operation of the "sensing–decision–learning–action" cycle in AAI: agents cannot adapt sensing





strategies in real time based on the model training status, nor can they compensate for reduced update frequencies caused by communication constraints, for instance, by increasing sensing efforts when channel conditions deteriorate. To address this, we focus on the joint optimization of sensing, communication, and computation (JSCC) for enabling AAI in wireless networks. Specifically, we investigate the joint design of sensing, communication, and computation policies throughout the distributed model training process, and explore both joint policy generation for individual agents and coordinated optimization methods for multi-agent systems. We aim to develop a JSCC collaborative optimization framework and technical solutions tailored to AAI model training. The objective is to provide theoretical support for the efficient deployment and autonomous evolution of AAI in wireless networks, laying a foundation for China to seize a leading position in the integrated development of 6G and AI.

TALK DETAILS

Time	Presentation
14:10-14:25 ET2189	Paper Title: Performance Analysis of Wireless Image Transmission over Fading Channels Author(s): Tianxiong Wang, Zijing Wang, Sen Wang, Chih-Lin I Presenter: Zijing Wang, Beijing Jiaotong University, China Abstract: This paper establishes a generalized cross-layer analytical framework to quantify the end-to-end expected reconstruction quality for wireless image transmission. The statistical expectation of the reconstruction quality is characterized for both additive white Gaussian noise (AWGN) and flat fading channel conditions. Specifically, for flat Rayleigh fading channels, the expected quality is formulated as a truncated integral, which is efficiently resolved into a semi-analytical form using Gauss-Laguerre quadrature. Furthermore, utilizing Jensen's inequality, we prove that the performance over a deterministic AWGN channel and a stochastic flat fading channel constitutes the theoretical upper and lower performance bounds for any practical wideband frequency-selective system. Numerical evaluations conducted with the modern AV1 Image File Format (AVIF) and the legacy Joint Photographic Experts Group (JPEG) standards validate the accuracy of the proposed analytical framework. The results demonstrate that the reconstruction quality suffers from severe degradation in flat fading environments.
14:25-14:40 ET2224	Paper Title: A Novel Non-Isovelocity GBSM for Underwater Acoustic Communication Systems Author(s): Yuxuan Li, Jie Huang, Yilin Ma, Cheng-Xiang Wang Presenter: Yuxuan Li, Southeast University, China Abstract: This paper proposes a novel geometry-based stochastic model (GBSM) for underwater acoustic (UWA) communication systems, incorporating non-



isovelocity conditions in shallow seas. Based on a layered sound speed profile (SSP) with different gradients, the proposed model enhances the physical accuracy in representing real sea conditions. Key channel parameters including Doppler shift, propagation distance, and delay are derived from fundamental geometric relationships. Furthermore, the temporal autocorrelation function (ACF) and frequency correlation function (FCF) of the channel with the layered SSP are both derived and simulated. The results clearly indicate that the model effectively characterizes UWA channel properties and reveals the significant impact of non-isovelocity conditions on channel characteristics.

**14:40-14:55
ET1027**

Paper Title: Dual Wideband Metamaterial High-Efficient Transmissive Circular Polarizer Using Complementary Split-Ring Resonator

Author(s): Farman Ali Mangi, Khan Muhammad Khoso, Arz Muhammad Maitlo, Abdul Khaliq Kachelo

Presenter: Farman Ali Mangi, Shah Abdul Latif University, Pakistan

Abstract: A dual wide band metamaterial circular polarizer with high transmissive mode using complementary split ring resonator is presented to demonstrate the asymmetric transmission of incident x-direction linear polarized (LP) wave in to right-hand CP (RHCP) and left-hand (LHCP) wave at 13.45-14.90 GHz and 14.99-17.21GHz. The innovative idea of the Fission Transmission of Electromagnetic waves (FTEM) is applied by using double layer to produce pure (CP) wave. Finally, a practical 4×4 optimal array is designed which obtained the optimal axial ratio bandwidth of 8.05% and 12.33% is obtained at dual bands. The accumulative band width of 20.88% is obtained across the 12.0GHz-18GHz. The extracted simulated and theoretical results demonstrate the efficiency of structure, in terms of optimal AR, transmission loss, circular dichroism, and broadband, for practical applicability for advanced polarization conversion applications. The axial ratio (AR) bandwidth of 10.93% and 14.20% is calculated at dual bands.

**14:55-15:10
ET3405**

Paper Title: Transformer-Based Neural Decoding via Enhanced Message-Passing Quality

Author(s): Wenkang Zhang, Jincheng Zhuang

Presenter: Wenkang Zhang, Shandong University, China

Abstract: Transformer-based decoding has become an effective approach for error-correcting codes. Among existing decoders, EfficientMPT has achieved superior decoding performance while maintaining relatively low computational complexity. However, its message-passing mechanism still has room for further improvement. In this paper, we propose two complementary methods to improve the message-passing quality of EfficientMPT. First, we propose a scoring method that guides code-equivalent parity-check matrix transformations, thereby yielding a matrix with a better structure that facilitates message passing. Second, we introduce a background message elimination mechanism to reduce background interference



during message aggregation in the attention module. Experimental results on LDPC, BCH, and Polar codes demonstrate that our approach outperforms EfficientMPT in terms of bit error rate (BER) and frame error rate (FER). For several codes, our method achieves a performance gain of approximately 0.5-0.6 dB.



TECHNICAL SESSIONS >>>

TS18: Aerial Communications, UAV Communications, Vehicular Networks (III)

Session Chair: Fangzhou Zhao, School of Electrical and Electronic Engineering, North China Electric Power University (NCEPU), China

Time 13:30-15:35 | Oct. 18, 2026

Venue Meeting Room 2

INVITED TALK | 13:30-13:50

Collaborative Semantic Communication for Embodied Intelligence: From Task-Oriented Perception to Communication-Control Co-Design

Fangzhou Zhao, School of Electrical and Electronic Engineering, North China Electric Power University (NCEPU), China



Abstract: Embodied intelligent systems increasingly rely on multiple agents to collaboratively perceive, communicate, and act in dynamic environments. This creates new challenges for efficiently transmitting task-relevant sensory information under limited communication and computing resources. This talk introduces collaborative semantic communication for embodied intelligence, focusing on task-oriented semantic representation, importance-aware transmission, and lightweight adaptive transceiver design. We further discuss communication-control co-design, particularly how communication-induced cognitive inconsistency affects multi-agent collaboration. Representative applications in UAV/UGV cooperation and multi-view 3D reconstruction are presented to illustrate the integration of communication, perception, and control in future embodied intelligent networks.

TALK DETAILS

Time	Presentation
	Paper Title: Game-Based WSP Selection and Bandwidth Allocation for UL/DL Decoupled C-V2X Author(s): Luofang Jiao, Pin Li, Qiang Cheng, Xingwei Ye, Jingbei Yang, Xianzhe Xu Presenter: Luofang Jiao, Nanjing Research Institute of Electronics Technology, China
13:50-14:05 ET2177	Abstract: In heterogeneous cellular vehicle-to-everything (C-V2X) networks, asymmetric uplink (UL) and downlink (DL) traffic demands, along with the transmit power disparity between macro base stations (MBSs) and small base stations (SBSs), threaten communication reliability. UL/DL decoupled access mitigates this by allowing vehicles to select serving base stations independently for each direction. However, in multi-operator scenarios with multiple wireless service providers (WSPs), two intertwined problems remain open: (i) how vehicles choose WSPs to balance quality of service and cost, and (ii) how WSPs allocate bandwidth



under competition. To address them, this paper proposes a joint game-theoretic framework for UL/DL decoupled C-V2X. First, we derive tractable spectral efficiency expressions for three representative decoupled access cases using stochastic geometry. Second, we formulate a hierarchical game: an evolutionary game for vehicle-side WSP selection, and a non-cooperative game for WSP-side bandwidth allocation, where we prove the uniqueness of the Nash equilibrium via contraction mapping theory. Extensive simulations demonstrate rapid convergence and robustness to perturbations, validating the effectiveness of the proposed framework.

Paper Title: Intelligent Trajectory and Beamforming Design for UAV-ISAC Systems under Jamming

Author(s): Chenxi Zhang, Helin Yang, Hao Liang

Presenter: Chenxi Zhang, Xiamen University, China

14:05-14:20
ET2205

Abstract: Integrated sensing and communication (ISAC) paired with unmanned aerial vehicles (UAVs) is poised to be a cornerstone of emerging 6G wireless networks. In this paper, we study a joint robust beamforming and 3D trajectory optimization problem for a 6G-oriented UAV-ISAC system navigating complex urban environments under continuous attacks from a dynamic active jammer. Given that the formulated optimization problem is highly non-convex and the 3D adversarial environment is exceptionally dynamic, we propose a novel two-stage hybrid optimization framework based on deep reinforcement learning (DRL) to maximize the overall system utility. Specifically, the inner stage derives a dynamic, distance-dependent robust beamforming scheme that proactively suppresses interference while strictly preserving the high-precision sensing capabilities mandated by 6G requirements. Furthermore, the outer stage develops a customized twin-delayed deep deterministic policy gradient (TD3) algorithm to optimize the continuous spatial trajectory. By engineering an angle-aware state space and employing a soft-min reward shaping technique, this designed DRL approach effectively captures the adversary's behavior and efficiently overcomes overestimation bias and gradient sparsity. Numerical simulations demonstrate that the proposed TD3-based framework significantly outperforms baseline DRL algorithms, achieving notable improvements in balancing system sum rates, ensuring multi-user fairness, and maintaining the robust sensing resilience essential for next-generation 6G networks.

14:20-14:35
ET2186

Paper Title: Online Trajectory Design of UAV Swarm for ILAC Service Provisioning to Multiple Ground Mobile Users

Author(s): Biru Wu, Suzhi Bi, Xiangyang Peng, Xiao-Hui Lin, Lianming Xu, Li Wang

Presenter: Biru Wu, Shenzhen University, China

Abstract: In post-disaster scenarios, uncrewed aerial vehicle (UAV)-enabled integrated localization and communication (ILAC) systems provide critical



emergency coverage for multiple mobile ground users. However, existing dynamic UAV deployment methods are mostly limited to single-user scenarios or static configurations, making them inadequate for the simultaneous tracking and communication needs of multiple moving victims in post-disaster environments. To address this, we propose a lightweight online joint trajectory optimization framework based on the alternating single-UAV maneuver (ASUM) strategy, where only one UAV maneuvers per time slot while others hover. By decoupling the joint planning into a two-layer sequential decision process, the framework leverages extended Kalman filtering (EKF) for dynamic user state prediction and successive convex approximation (SCA) for single-UAV trajectory convexification, dynamically reshaping swarm geometry to guarantee dual quality-of-service constraints for all users. Numerical results demonstrate 59.1% and 54.2% reductions in per-UAV movement distance over rigid formation and two-fixed-one-moving benchmarks, respectively, with an average localization error of 2.73 m and robust communication rates. The proposed framework offers a practical solution for resource-constrained aerial ILAC networks.

Paper Title: Achieving Tail-Risk-Aware Multi-Target TOA Localization via UAV Placement under Spatially Heterogeneous Shadowing

Author(s): Yuehong Chen, Suzhi Bi, Xiao-Hui Lin, Lianming Xu, Li Wang

Presenter: Yuehong Chen, Shenzhen University, China

14:35-14:50
ET2185

Abstract: Uncrewed aerial vehicles (UAVs) can provide flexible aerial anchors for time-of-arrival (TOA) localization when terrestrial infrastructure or global navigation satellite system (GNSS) signals are degraded or unavailable. However, placement designs based on deterministic geometry or mean-error criteria may be fragile in spatially heterogeneous propagation environments, where shadowing can induce large upper-tail localization errors. This paper formulates a risk-aware multi-target movable-UAV placement problem that minimizes the expected value of a localization-error surrogate while controlling target-wise tail risk. One normalized conditional value-at-risk (CVaR) constraint is imposed per target as a conservative approximation to the corresponding chance constraint. We solve the resulting problem using an augmented Lagrangian method that applies a smooth maximum to the normalized CVaR residuals across targets. Numerical results on a controlled benchmark with heterogeneous shadowing show that the proposed method reduces both average localization error and worst-target tail risk compared with expectation-only optimization and a weighted geometric dilution of precision (GDOP) baseline that ignores random shadowing. In the main benchmark experiment, the proposed method reduces the worst-target CVaR95 by approximately 67% relative to expectation-only optimization, corresponding to an absolute reduction of approximately 525m. Sensitivity results further show that this tail-risk reduction becomes more pronounced as spatial shadowing intensifies.

14:50-15:05

Paper Title: Calculation of Achievable Rate for Lognormal Effective Channels in

**ET3293**

Finite Blocklength Regime

Author(s): Yuan Zhang, Guoli Tu

Presenter: Guoli Tu, Southeast University, China

Abstract: This work studies the theoretical problem on how to generalize the finite blocklength Polyanskiy-Poor-Verdu Formula (PPV) formula which was proposed for additive white Gaussian noise (AWGN) channels to lognormal effective channels in which the end-to-end signal-to-noise ratio (SNR) after physical-layer receiver processing can be modeled as a lognormal random variable. Two theoretical formulas are proposed. The first formula is used to calculate the average error probability of lognormal channels, in which the integral required for the mathematical expectation operation is eliminated. Based on the first formula, the second formula is proposed to calculate the achievable rate of lognormal channels, from which it is shown that an approximate form of the PPV formula for AWGN channels can be derived. Hence, the proposed formulas can be considered as the generalization of the PPV formula from AWGN to lognormal channels. Numerical results are reported to verify the correctness of the proposed formulas.

Paper Title: Energy-Efficient Data Collection and Quantization in Multi-UAV Collaborative Low-Altitude Networks

Author(s): Ziwen Ling, Chen Xu, Sichen Liu

Presenter: Ziwen Ling, Beijing University of Posts and Telecommunications, China

**15:05-15:20
ET3333**

Abstract: The low-altitude economy provides new opportunities for target detection, as unmanned aerial vehicles (UAVs) improve detection efficiency through aerial surveillance and data collection. High-altitude platform (HAP)-supported multi-UAV collaborative networks enable efficient model training by aggregating sensing data from distributed ground devices. However, transmitting large-scale raw data over bandwidth-limited backhaul links causes communication bottlenecks, while limited onboard energy often forces the system to neglect remote users, introducing data bias that compromises model accuracy. Therefore, this paper proposes a data collection and quantization framework that trades off model training accuracy against resource consumption. Specifically, we formulate a fairness-aware energy efficiency (FEE) maximization problem by jointly optimizing user association, UAV trajectories, bandwidth allocation, and data quantization ratios. To solve this time-related mixed-integer non-convex problem, we propose a K-means-based user association and multi-agent proximal policy optimization (MAPPO) algorithm augmented by convex optimization for quantization and resource allocation. Simulation results demonstrate that the proposed algorithm outperforms baseline schemes in balancing model accuracy, energy consumption, and service fairness.

**15:20-15:35
ET4486**

Paper Title: Coverage Optimization for UAV-Assisted mmWave Vehicular Networks Based on Deep Q-Network



Author(s): Shuo Gong, Jing Li, Yupeng Wang, Yuhan Zhang, Jiayi Xie, Yibing Wang
Presenter: Jing Li, Qingdao University of Science and Technology, China

Abstract: Unmanned aerial vehicles (UAVs) are utilized as aerial base stations (BSs) to provide continuous coverage for millimeter-wave (mmWave) vehicular networks.

In such scenarios, vehicle mobility and time-varying blockage conditions pose challenges to reliable vehicular communications. To address this issue, we conduct UAV trajectory planning in dynamic vehicular environments. Considering the impact of dynamic blockage on mmWave links, we formulate an optimization problem to minimize the average service outage ratio. The problem is modeled as a Markov decision process (MDP), and a deep Q-network (DQN)-based scheme is proposed to learn the UAV movement policy.

Simulation results demonstrate that the proposed scheme effectively reduces the average service outage ratio and outperforms the benchmark UAV trajectory strategy.

TECHNICAL SESSIONS >>>

TS19: AI for Communications and Networks (II)

Session Chair: Long Luo, University of Electronic Science and Technology of China, China

Time 13:30-15:30 | Oct. 18, 2026

Venue Meeting Room 3

INVITED TALK | 13:30-13:50

Advancing Radio Map Construction and Obstacle Sensing: An Integrated Generative Framework in THz Band

Shuai Wang, University of Electronic Science and Technology of China, China

Abstract: Integrated sensing and communication (ISAC) in the terahertz (THz) band enables obstacle detection, which in turn facilitates efficient beam management to mitigate THz signal blockage. Simultaneously, a THz radio map, which captures signal propagation characteristics through the distribution of received signal strength (RSS), is well-suited for sensing, as it inherently contains obstacle-related information and reflects the unique properties of the THz channel. This means that communication-assisted sensing in ISAC can be effectively achieved using a THz radio map. However, constructing a radio map presents significant challenges due to the sparse deployment of THz sensors and their limited ability to accurately measure the RSS distribution, which directly affects obstacle sensing. In this paper, we formulate an integrated problem for the first time, leveraging the mutual enhancement between sensed obstacles and the constructed THz radio maps. To address this challenge while improving generalization, we propose an integration framework based on a conditional generative adversarial network (CGAN), which uncovers the manifold structure of THz radio maps embedded with obstacle information. Furthermore, recognizing the shared environmental semantics across THz radio maps from different beam directions, we introduce a novel voting-based sensing scheme, where obstacles are detected by aggregating votes from THz radio maps generated by the CGAN. Simulation results demonstrate that the proposed framework outperforms non-integrated baselines in both radio map construction and obstacle sensing, achieving significant reductions in mean squared error (MSE), respectively, in a real-world scenario.



INVITED TALK | 13:50-14:10



Exploiting Structure-Aware Shrinkage for Near-Field Jointly-Correlated UM-MIMO Channel Estimation

Shuaifei Chen, Xi'an University of Posts and Telecommunications, China



Abstract: Near-field channel estimation for multi-user ultra-massive multiple-input multiple-output (UM-MIMO) is severely challenged by limited pilot resources and high computational complexity, especially when massive antenna arrays are equipped at both the base station and user sides. In this paper, we propose a low-complexity structure-aware shrinkage (SAS) estimator that performs efficient element-wise filtering by exploiting the structural eigenmode sparsity of jointly-correlated channels. We theoretically show that it asymptotically approaches the performance of the linear minimum mean-squared error (LMMSE) estimator as spatial resolution improves. For practical scenarios with few user antennas, we further propose a Block-SAS estimator to explicitly model and whiten block-dense spatially correlated interference. Simulation results confirm that both proposed schemes outperform existing baselines, with Block-SAS specifically achieving near-optimal LMMSE accuracy and robust pilot contamination suppression under finite-aperture conditions.

INVITED TALK | 14:10-14:30

Toward Efficient Network Experiment Automation with LLM Agents

Long Luo, University of Electronic Science and Technology of China, China



Abstract: LLM agents offer new opportunities to reduce the manual effort and expertise required for network experimentation. This talk explores their role in advancing network experiment automation, highlighting the challenges of achieving both reliability and efficiency. It discusses research directions for translating high-level requirements into valid experiments while reducing human intervention and overall automation costs.

TALK DETAILS

Time

Presentation

Paper Title: Causal-GPT: Causality-Enhanced Large Language Models for Wireless Traffic Prediction

Author(s): Dongjiao Sun, Jingping Qiao, Shuo Wang, Chuanting Zhang

Presenter: Shuo Wang, Shandong Normal University, China

14:30-14:45
ET2123

Abstract: Next-generation wireless networks are expected to provide low-latency and high-throughput services by integrating artificial intelligence (AI) into network management and optimization. Accurate wireless traffic prediction is a key enabler for proactive resource allocation, including bandwidth scheduling and computing capacity provisioning, thereby mitigating network congestion and improving quality of service (QoS). Existing methods mainly rely on deep learning or



reinforcement learning to capture spatiotemporal correlations in traffic data. However, such correlation-driven modeling may fail to reveal the underlying causal factors of traffic dynamics, which limits prediction accuracy and generalization capability under complex and non-stationary network conditions. To address this challenge, we propose Causal-GPT, a wireless traffic prediction framework that integrates self-supervised spatiotemporal causal discovery with a large language model. Specifically, a Granger causality-based discovery module is designed to construct causal graphs among traffic variables from observational data, uncovering latent spatiotemporal causal dependencies. The learned causal structure is further incorporated into a pre-trained language model through a causality-enhanced token interaction mechanism, enabling causal-aware traffic representation and prediction. Extensive experiments on two real-world wireless traffic datasets show that Causal-GPT consistently outperforms representative baseline models in prediction accuracy, demonstrating the effectiveness of combining causal modeling with large language models for wireless traffic prediction.

Paper Title: End-to-End Maximum Throughput Prediction in Ad Hoc Networks with Path-Level Wireless Features

Author(s): Jinxin Guo, Xiaofeng Zhong

Presenter: Jinxin Guo, Tsinghua University, China

14:45-15:00
ET2245

Abstract: Accurate end-to-end maximum throughput prediction could support routing, admission control, and bandwidth reservation in wireless ad hoc networks. PathExoFormer-MoE is proposed as a protocol-agnostic predictor for chain-structured ad hoc paths. At each 1-second step, the model predicts the empirical receiver-side throughput upper bound from a complete causal input. The input contains four components: (i) the historical target-throughput sequence; (ii) lag variables, rolling statistics, and multiscale trend descriptors computed only from historical throughput; (iii) current-window node-level wireless measurements and link counters, including adjacent-hop signal-to-noise-ratio matrix entries, dual-antenna received-signal-strength measurements, multi-frequency noise measurements, average ambient-noise level, burst-noise level and ratio, capture counters, cyclic-redundancy-check error counters, automatic-repeat-request retransmission counters, overflow counters, receive-loss counters, Ethernet packet and byte counters, and physical-layer packet and byte counters; and (iv) a graph state formed by the path nodes and adjacent-hop links. The supervised target is the receiver-side 1-second iperf rate for a specified source-destination pair on a fixed forwarding path, under one saturated UDP flow, and without competing traffic. PathExoFormer-MoE encodes the target history, a strictly causal path context, and the path graph, combines their representations by pooling, concatenation, and a fusion multilayer perceptron, and applies a three-expert mixture-of-experts quantile predictor. Low/near-zero-throughput risk estimation



and a no-degradation rule further improve robustness on high-relative-error samples. On campus field datasets, PathExoFormer-MoE decreases the mean absolute relative error by 42.71 percent, 27.38 percent, and 23.22 percent on one-hop, two-hop, and three-hop paths, respectively, compared with the adapted baseline; the corresponding reductions in 99th-percentile absolute relative error are 58.46 percent, 33.39 percent, and 23.56 percent. On a common processor platform, the main neural network contains approximately 209,000 trainable parameters, requires 1.383 million multiply-accumulate operations per sample, and occupies 0.842 MiB as a serialized weight file. The mean final-prediction generation time is 88.30 ms per sample, below the approximately 1 s inter-sample interval.

Paper Title: Dynamic Cooperative Clustering in Space-Air-Ground Integrated Networks: A Deep Reinforcement Learning Approach

Author(s): Yifan Yue, Daixin Xie, Xiaoling Hu, Chenxi Liu

Presenter: Chenxi Liu, Beijing University of Posts and Telecommunications, China

15:00-15:15
ET3399

Abstract: Cooperative clustering enables efficient task processing through the coordination of heterogeneous computing resources in space-air-ground integrated networks (SAGINs). In this paper, we propose a dynamic cooperative clustering scheme for a SAGIN comprising stationary unmanned aerial vehicles (UAVs), shared dynamic UAVs, and low Earth orbit (LEO) satellites. For each service region, the resulting cooperative cluster includes stationary UAVs responsible for task collection and local computation, allocated dynamic UAVs that supplement regional computing capacity, and visible LEO satellites that provide auxiliary computation and connectivity. Considering the mismatch between regional task demand and the availability of heterogeneous computing resources in SAGINs, we develop a deep reinforcement learning (DRL)-based cooperative clustering algorithm. The algorithm periodically updates clusters through dynamic UAV allocation and supports task processing by making offloading decisions within each cluster at a fine timescale. A deadline-aware admission control module admits only tasks predicted to meet their deadlines under the available offloading options. Simulation results show that the proposed scheme improves task-completion performance across varying task loads while completing more tasks per dynamic UAV and exhibiting lower inter-cluster load imbalance than the evaluated benchmark schemes under heavy load.

15:15-15:30
ET4520

Paper Title: Detection and Localization of Silent Absorbing Target in 2D Molecular Communication Systems

Author(s): Sen Wang, Wenhui Tang

Presenter: Weitang Lin, Guangzhou University, China

Abstract: Molecular communication (MC) enables information exchange in micro- and nanoscale environments where conventional electromagnetic communication is difficult to realize. However, its diffusion-driven propagation allows a silent



absorbing target (SAT) to intercept information molecules without actively emitting signals. This paper investigates SAT detection and localization in a planar diffusion-based MC system. The receiver records cumulative molecular arrivals in upper and lower absorption regions, and the normalized directional profiles characterize absorption-induced temporal distortions. A Euclidean distance-based detector first identifies deviations from a no-SAT reference. A hierarchical grid search then estimates the target position, followed by local refinement with Monte Carlo-averaged templates. Simulation results demonstrate that the proposed detector effectively distinguishes SAT-present and SAT-absent cases, while refinement improves localization accuracy by reducing both mean and median position errors. These findings support the use of received-signal perturbations to detect and locate silent absorbing targets.

TECHNICAL SESSIONS >>>

TS20: Space-Air-Ground Communication and Space Networking (II)

Session Chair: Kainan Wang, Wuhan University, China

Time 13:30-15:20 | Oct. 18, 2026

Venue Meeting Room 4

INVITED TALK | 13:30-13:50

Preliminary Design for Ground-Based Adaptive Optics for Low-Altitude UAV Observation

Kainan Wang, Wuhan University, China

Abstract: This paper investigates an Adaptive Optics (AO) system for ground-based high-resolution observation of low-altitude Unmanned Aerial Vehicles (UAVs). Atmospheric turbulence along finite horizontal propagation paths is modeled to evaluate the required spatial correction capability and control bandwidth. A compact Deformable Mirror (DM) employing piezoelectric stack actuators is subsequently designed and numerically assessed. Finite Element (FE) simulations demonstrate accurate reconstruction of representative Zernike modes, while structural dynamic analysis gives a first natural frequency to achieve sufficient tracking speed. The results indicate that the proposed architecture can support high-bandwidth wavefront correction and provides a scalable, potentially cost-effective solution for future low-altitude surveillance and observation networks.



TALK DETAILS

Time	Presentation
13:50-14:05 ET2135	Paper Title: BCTFormer-Based Joint Computation Offloading and Resource Allocation in Space-Air-Ground Integrated Networks Author(s): Shan Lu, Xiao Yu, Xin Wang, Yongbo Yao, Gang Liang Presenter: Shan Lu, Beijing Institute of Technology, China Abstract: The integration of low Earth orbit (LEO) satellites and unmanned aerial vehicles (UAVs) offers a promising paradigm for Internet of Things (IoT) services. In this paper, we consider a space-air-ground integrated network (SAGIN) in which the IoT devices (IDs) offload computation tasks to LEO satellites with the aid of UAVs. However, the high mobility of LEO satellites and the increasing quality-of-service (QoS) requirements of IDs render conventional strategies ineffective. To address these challenges, this paper proposes a Bidirectional Causal-Temporal Transformer (BCTFormer) framework for joint access control, computation offloading, and subcarrier (SC) allocation in the considered SAGIN. The proposed BCTFormer consists of a Data Causal Aware Module (DCAM) and a Temporal Dependency Aware Module (TDAM), which capture inter-ID dependencies and long-term temporal dependencies, respectively. BCTFormer achieves a handover



**14:05-14:20
ET2115**

failure rate of less than 3% and reduces mean delay by 51.3% compared with the no-prediction baseline at 1000 IDs.

Paper Title: Datasets for Encrypted-Traffic Network Intrusion Detection: A Construction-Oriented Survey

Author(s): Yuan Pan, Yixin Jiang, Liang Xuan, Kaitian Huang, Guocong Feng, Wenqian Xu, Yiwei Yang, Yunan Zhang, Leyu Bi, Chao Hong, Jiayi Wang, Shituo Ma
Presenter: Shituo Ma, China Southern Power Grid Company Limited, China

Abstract: Network intrusion detection is a central task in security operations, but the increasing deployment of encrypted transport protocols has changed the information available to detection systems. Instead of relying on payload inspection, recent network intrusion detection systems increasingly depend on statistical patterns, protocol metadata, temporal behavior, and learned representations. This shift makes dataset construction a first-order factor: a model trained on outdated protocols, simplified attacks, or weak labels may report high accuracy while failing to reflect current encrypted network environments. Existing surveys provide broad catalogs of intrusion detection datasets, traffic analysis tools, and encrypted traffic classifiers. However, less attention has been paid to how encrypted-traffic intrusion detection datasets are constructed and what construction choices determine their usefulness. This survey reviews representative datasets and recent progress from two construction axes: traffic collection and traffic annotation. The collection axis covers network environment, protocol coverage, benign background traffic, malicious traffic generation, and attackstage organization. The annotation axis covers label provenance, protocol metadata, preprocessing records, traceability, and semantic evidence. We further discuss emerging directions, including lifecycle-aware attack collection, protocol-aware metadata preservation, auditable labeling pipelines, and evidence-oriented annotations for interpretable detection.

**14:20-14:35
ET3301**

Paper Title: Closed-Form Beamforming for ISJC Systems under Statistical Probability Outage Constraints

Author(s): Chang Liu, Yuqi Hu, Chongwen Huang, Li Wei, Jianbin Wang, Shuyuan Shi, Jiayun Bao, Yu Ye
Presenter: Chang Liu, Zhejiang University, China

Abstract: To address the severe resource waste and performance conservatism caused by the strict pursuit of zero-outage probability in conventional robust beamforming for Integrated Sensing, Communication, and Jamming systems, this paper proposes a low-complexity closed-form beamforming scheme constrained by statistical outage probabilities. Instead of relying on deterministic worst-case error models, the proposed scheme characterizes channel estimation errors statistically and leverages the union bound theory to decouple the aggregate signal-to-interference-plus-noise ratio outage into three independent sub-events:



desired signal fading, multiuser interference, and radar/jamming power leakage. By employing null-space projection and zero-forcing for spatial signal decoupling, the relaxed statistical constraints are transformed into deterministic linear equations. This novel transformation facilitates the derivation of a pure analytical closed-form solution for optimal joint power allocation without requiring any iterative procedures. Simulation results demonstrate that the proposed scheme effectively breaks the performance bottleneck of deterministic worst-case designs. Compared to conventional methods, it successfully releases redundant communication power to enhance radar sensing and jamming capabilities, achieves precise spatial energy decoupling, and reduces computational complexity by several orders of magnitude.

Paper Title: Anti-Wave Occlusion Design of Unmanned Surface Vessel Satellite Communication Based on Sea Wave Modeling

Author(s): Zixi Fang, Tian Li, Bo Wu, Chenhua Sun

Presenter: Zixi Fang, Academy for Network & Communications of CETC, China

14:35-14:50
ET4438

Abstract: Aiming at the anti-wave occlusion design of Unmanned Surface Vessel (USV) satellite communication in 6G Non-Terrestrial Networks (6G NTN), this paper researches sea wave modeling and signal processing. Firstly, to accurately depict the randomness of sea waves, a three-dimensional Poisson Cluster Point Process (3D-PCP) is proposed based on stochastic geometry. Secondly, we derive and analyze the impact of wave occlusion on transmission performance by using the successful communication probability and communication capacity. Furthermore, we present criteria for optimizing the launch parameters of the USV based on connectivity theory, enabling the USV to adapt to wave occlusion. Finally, a signal processing scheme exploiting the CP-OFDM waveform based on fountain codes (FC-CP-OFDM) is given to improve the connectivity, which applies to the uplink of the USV. The simulation results demonstrate the effectiveness of the proposed method in satellite communication transmission against sea wave occlusion.

Paper Title: LLM-Driven Joint Access and Backhaul Routing Optimization in LEO Satellite Networks

Author(s): Xuehao Wu, Ran Zhang, Yuchen Yang, Yunxin Geng, Qinqin Tang, Jiang Liu

Presenter: Xuehao Wu, Beijing University of Posts and Telecommunications, China

14:50-15:05
ET3414

Abstract: Low Earth orbit (LEO) satellite networks provide flexible broadband access but face high network dynamics and constrained space-based backhaul. Conventional access selection and backhaul routing are typically decoupled, with access decisions largely overlooking inter-satellite link (ISL) backhaul conditions and heterogeneous QoS requirements, raising significant challenges for end-to-end QoS assurance. To address this issue, this paper proposes a large language model (LLM)-driven joint access and backhaul routing optimization framework for



LEO satellite networks. The framework employs a LangGraph-based workflow and a ReAct-style agent to orchestrate intent recognition, network-state acquisition, access selection, backhaul routing, and QoS feedback. A reinforcement-learning-based method performs access satellite selection by incorporating access conditions together with backhaul reliability, load, and delay. Furthermore, a routing module provides feasible end-to-end backhaul paths over ISL and ground-satellite link segments. Simulation results show that the proposed framework outperforms representative baselines in terms of throughput, delay, and end-to-end reliability.

Paper Title: Joint Wideband Signal Recognition and Localization for Constructing Low-Altitude Spectrum Semantic Map

Author(s): Hongkai Wu, Peihao Dong, Shen Gao, Qihui Wu

Presenter: Hongkai Wu, Nanjing University of Aeronautics and Astronautics, China

15:05-15:20
ET3361

Abstract: Wideband spectrum sensing, modulation recognition, and emitter localization are often treated as separate tasks, although low-altitude spectrum monitoring requires their results to be associated with the same signal. This paper proposes a joint wideband signal recognition and localization framework for spectrum semantic map construction using multi-receiver observations. Occupied frequency regions are first detected and used to define common signal-extraction windows across receivers. The extracted signals are resampled for multi-receiver automatic modulation classification (AMC), while their original-rate counterparts are retained for time-difference-of-arrival (TDOA) localization. Each recovered frequency interval is then associated with its modulation label and estimated emitter position. Simulation results show improved frequency-region recovery over energy detection, improved modulation recognition over a single-receiver baseline, and increasingly reliable sensing-driven TDOA localization as the array in-band signal-to-noise ratio increases. The proposed framework therefore jointly obtains and associates the frequency, modulation, and location information required for spectrum semantic map construction.

TECHNICAL SESSIONS >>>

TS21: Integrated Sensing and Communication (I)

Session Chair: Fei Li, Nanjing University of Posts and Telecommunications, China

Time 13:30-15:20 | Oct. 18, 2026

Venue Meeting Room 5

INVITED TALK | 13:30-13:50

Learning-Driven Channel Representation for Wireless Localization: From Channel Observations to Location Inference

Chenglong Li, National University of Defense Technology, China

Abstract: Wireless observations capture radio signal responses formed through interactions with propagation environments and spatial geometry. In integrated sensing and communication, such observations have become an important basis for high-accuracy localization beyond conventional channel estimation. Learning-driven methods learn implicit relations between channel propagation and spatial position, enabling location inference under complex channel conditions. However, the useful information is tightly coupled with environmental layout, temporal dynamics, hardware differences, and system configurations. This coupling obscures the inference process and weakens performance consistency across scenarios. We model the localization process as a unified wireless observation, channel representation, and location inference framework. We highlight that the quality and usability of channel representations are critical to exploiting propagation information, and thus play a decisive role in localization performance.



TALK DETAILS

Time	Presentation
	Paper Title: Cumulative Sensing-Aware Path Planning in Networked MIMO-ISAC Systems Author(s): Zhanfeng Zhong, Jintao Wang, Zheng Shi, Xu Wang, Pingping Zhang, Guanghua Yang, Shaodan Ma Presenter: Jintao Wang, Jinan University, China
13:50-14:05 ET1081	Abstract: Networked multiple-input multiple-output (MIMO) integrated sensing and communication (ISAC) provides a promising architecture for exploiting spatial diversity in both target sensing and wireless communication. However, most existing path planning studies optimize instantaneous performance or rely on simplified trajectory assumptions, leaving the cumulative sensing and communication (S&C) performance along moving-target trajectories insufficiently characterized. This paper develops a cumulative sensing-aware path planning framework for moving targets in networked MIMO-ISAC systems. First, a



cooperative passive sensing model is established, where a central ISAC base station and distributed access points jointly collect echo signals for target detection. A path exposure metric based on the accumulated probability of detection (PoD) is introduced to quantify trajectory-level cumulative sensing performance, enabling joint consideration of cumulative sensing and communication requirements. Then, a mission-time minimization problem is formulated by jointly optimizing the moving trajectory and transmit power allocation subject to S\&C constraints. To handle the resulting non-convex and sequential decision-making problem, it is reformulated as a Markov decision process (MDP), and a deep reinforcement learning (DRL)-based solution is developed. Simulation results demonstrate that the proposed framework effectively reduces the trajectory completion time while satisfying cumulative S\&C requirements, and achieves superior performance compared with equal power allocation, active-sensing-only, and DQN-based benchmark schemes.

Paper Title: RFID Reconfigurable Sensing Antenna with Vibration Sensing

Author(s): Tianlong Zhong, Yong Zhong, Jiacheng Huang, Nan Zhao, Xiaodong Yang

Presenter: Tianlong Zhong, Xidian University, China

14:05-14:20
ET1009

Abstract: This paper focuses on the application of antennas in vibration detection and elaborates on the principles of using radio frequency identification (RFID) antennas to detect vibration. The vibration sensor used in the study is a patch miniature ball vibration switch, which triggers changes in the internal circuit of the switch through the movement of a metal ball inside. In the field of vibration monitoring, radio frequency identification (RFID) tags offer advantages such as low cost, easy deployment, and compact size. What's more, they can be effectively deployed in places where traditional sensors are difficult or impractical to install – such as tight spaces or obstructed views. In this paper, the vibration switch is embedded into the antenna structure, so that the antenna not only has the inherent communication function of the antenna, but also adds the sensing function, and the antenna changes from a traditional transducer device to a reconfigurable sensing antenna (RSA) with communication and sensing integration. The antenna performance changes as the sensor's circuit characteristics change, so changes in external physical quantities can be detected by monitoring certain parameters of the antenna, such as return loss (S₁₁).

14:20-14:35
ET2207

Paper Title: AFDM-Based CoMP-ISAC for Dense V2X Networks: 4D Point Cloud Reconstruction and Energy-Efficient Resource Allocation

Author(s): Ziyue Wang, Jianing Zhao, Changjian Song, Jiayi Song, Lingyu Xia, Zhenjia Gao

Presenter: Ziyue Wang, Southeast University, China



Abstract: This paper proposes an Affine Frequency Division Multiplexing (AFDM)-based Coordinated Multi-Point Integrated Sensing and Communications (CoMP-ISAC) framework for dense Vehicle-to-Everything (V2X) scenarios. For target sensing, AFDM range-Doppler processing is combined with ordered statistic cell-averaging constant false alarm rate (OSCA-CFAR), dynamic non-maximum suppression (NMS), and coupled one dimensional Multiple Signal Classification (1D-MUSIC) with forward-backward spatial smoothing for low-complexity 4D point cloud reconstruction. In multi-base-station scenarios, energy efficiency maximization is an important problem; therefore, a sensing-aware power-budget constraint is introduced and solved by user association search, zero-forcing (ZF) precoding, Dinkelbach-based fractional programming, and Karush-Kuhn Tucker (KKT) water filling. Simulations show that AFDM improves weak-target detection and point cloud integrity over Orthogonal Frequency Division Multiplexing (OFDM). Cooperative allocation also improves energy efficiency over the noncooperative benchmark.

Paper Title: Sum-Rate Maximization for Dedicated Dual-RIS-Assisted ISAC Systems

Author(s): Yi Ma, Qing Xue, Zhidu Li, Shaodan Ma

Presenter: Yi Ma, Chongqing University of Posts and Telecommunications, China

**14:35-14:50
ET2124**

Abstract: In complex environments, the performance of integrated sensing and communications (ISAC) is constrained by the quality of line-of-sight (LoS) links. Focusing on the scenario where LoS links to both communication users and sensing targets are interrupted, this paper investigates dedicated dual-reconfigurable intelligent surface (RIS)-assisted ISAC. In this context, by jointly designing hybrid sensing-communication beamforming and RIS phase shift matrices, we focus on the multi-user sum-rate maximization problem while guaranteeing sensing performance. To solve the formulated multi-variable nonconvex optimization problem, we integrate semidefinite relaxation and successive convex approximation methods to reconstruct and decouple the original problem, and then design an alternating optimization algorithm for efficient solution.

Paper Title: Robust Sum Secrecy-Rate Maximization for 6DMA-Enabled ISAC in UAV-Assisted Power Grid Systems

Author(s): Na Cao, Ying Xu, Chunjiao Huang, Rixuan Qiu, Quan Feng, Haonan Gong, Xiayue Wang

Presenter: Xiayue Wang, Beijing Jiaotong University, China

**14:50-15:05
ET4494**

Abstract: Integrated sensing and communication (ISAC) waveforms can be intercepted by malicious unmanned aerial vehicles (UAVs) while being reused for target sensing, thereby threatening the physical-layer security (PLS) of power-grid inspection communications. In this paper, we investigate robust PLS for a six-dimensional movable antenna (6DMA)-enabled ISAC system in UAV-assisted



power-grid inspection. A 6DMA-equipped base station serves multiple legitimate UAVs while sensing a malicious UAV. Under bounded location uncertainties, we maximize the worst-case sum secrecy rate by jointly optimizing the transmit precoders and the 6DMA position and rotation, subject to Cramér-Rao bound, leakage-power, transmit-power, and pose-feasibility constraints. A constraint-generation, alternating-optimization, and successive-convex-approximation (CG-AO-SCA) algorithm is developed to handle the semi-infinite constraints and nonconvex coupling. Simulation results demonstrate that the proposed robust 6DMA design achieves a higher worst-case sum secrecy rate while satisfying the sensing and security requirements.

Paper Title: Integrated Sensing and Communication with Clipped OFDM Signals

Author(s): Caiyi Huang, Haihui Zhang, Teng Ma, Chongda Huang, Yue Xiao, Gang Wu

Presenter: Caiyi Huang, University of Electronic Science and Technology of China, China

15:05-15:20
ET3330

Abstract: With the soaring demand for high-speed data transmissions and accurate target sensing, the application of integrated sensing and communication (ISAC) has already raised intensive concerns nowadays. By collectively employing multi-input multi-output (MIMO) orthogonal frequency division multiplexing (OFDM) and multiple signal classification (MUSIC)-derived scheme, both sensing and communication tasks can be simultaneously accomplished. However, noticing that the introduction of clipping to OFDM-derived systems might exacerbate the performance of target positioning in ISAC, this letter provides an analysis of clipping noise lying in the joint angle-of-arrival (AoA) and angle-of-departure (AoD) estimation-oriented MIMO-OFDM systems. In addition, the Cramér-Rao bound (CRB) is utilized for further performance assessment. Finally, simulations are conducted to verify the aforementioned analysis that the involvement of clipping in ISAC-OFDM systems poses a challenging threat on the angle searching accuracy.

TECHNICAL SESSIONS >>>

TS22: Signal Processing for Communications (II)

Session Chair: Xiaoqiang Hua, National University of Defense Technology, China

Time 13:30-15:55 | Oct. 18, 2026

Venue Meeting Room 6

INVITED TALK | 13:30-13:50

Channel-Aware Fingerprint Localization for Underground Parking Using Multi-Frequency CSI

Chen Huang, Purple Mountain Laboratories and Southeast University, China

Abstract: To achieve the vision of sixth-generation (6G) wireless communication systems, accurate channel modeling for diverse emergency scenarios is essential. This paper proposes a three-dimensional (3D) non-stationary multiple-input multiple-output (MIMO) geometry-based stochastic model (GBSM) for stairwell scenarios. The proposed channel model considers the effects of stairwell geometry on path loss, cluster evolution, and intra-cluster distributions. An effective propagation distance path loss model is developed to characterize the attenuation caused by the stairwell structure. Furthermore, platform effect and pedestrian blockage are introduced to describe the dynamic propagation environment. Based on the proposed channel model, channel characteristics, including spatial cross-correlation function (SCCF), angular power spectral density (PSD), and root mean square (RMS) delay spread are derived and analyzed. Results are further compared with those of 3GPP TR 38.901 and 6G pervasive channel model (6GPCM), demonstrating that the proposed channel model can effectively capture the influence of stairwell physical features on channel characteristics.



INVITED TALK | 13:50-14:10

MIG Detector: From Shallow to Deep Manifold

Xiaoqiang Hua, National University of Defense Technology, China

Abstract: This talk presents a progressive information-geometric framework for target detection on the Riemannian manifold. We introduce four interconnected detectors. The matrix information geometry detector (MIG) models covariance matrices as points on a Hermitian positive definite (HPD) manifold and employs geometric metrics for robust target detection. To reduce dimensionality and computational cost, the manifold dimensionality reduction detector projects HPD matrices onto lower-dimensional manifold subspaces while preserving discriminative geometry. Finally, the deep manifold network learns hierarchical matrix-valued representations, trained end-to-end with a manifold-preserving loss. Experiments on radar datasets demonstrate consistent improvements over the shallow Riemannian baselines. We conclude with computational considerations





and future research directions.

TALK DETAILS

Time	Presentation
14:10-14:25 ET2201	Paper Title: Tyler-Riemannian-Based Robust DOA Estimation with Movable Antenna Arrays Author(s): Xiaoqian Wu, Junlin Zhang, Yingchang Ma, Jin Li, Mingqian Liu, Zhisong Hao, Hai Tian Presenter: Xiaoqian Wu, Xidian University, China Abstract: This paper investigates the problem of estimating the direction of arrival (DOA) of a desired terrestrial signal at an airborne receiver by using movable antenna (MA) arrays and Riemannian-manifold-based optimization. In contrast to existing work, we develop a Tyler-Riemannian self-calibrated DOA estimator in the presence of active interferers and heavy-tailed noise. We first formulate a Tyler-based joint covariance recovery problem on the product manifold $\mathcal{F}^{\mathbb{C}}_{\{\mathbb{C}\}}\{M,K\} \times \mathcal{P}(M)$, where auxiliary interference-plus-noise observations and mixed observations are jointly exploited to estimate the interference-plus-noise covariance and the low-rank signal covariance. Then we leverage the rotation-invariant structure of the MA subarrays to self-calibrate the movable extension subarray and perform MUSIC on the compensated covariance matrix. Numerical results demonstrate the effectiveness of the proposed estimator, showing that it reduces the RMSE from 20.165° to 0.869° at -9 dB compared with the SCM-based calibrated baseline and remains more stable than the uncalibrated and ULA baselines in low-SNR settings with cochannel interference and heavy-tailed background noise.
14:25-14:40 ET3345	Paper Title: Global Bound-Guided Exact Search for Low-PAPR AFDM Chirp-Parameter Selected Mapping Author(s): Ziyue Qi, Xiaojun Wang Presenter: Ziyue Qi, Southeast University, China Abstract: Selected mapping (SLM) can reduce the peak-to-average power ratio (PAPR) of affine frequency division multiplexing (AFDM) by selecting the minimum-PAPR waveform from a prescribed candidate set. Chirp-parameter selected mapping (CSM) applies this principle through a prescribed AFDM c2 codebook, but exhaustive CSM evaluates every candidate on the finite L-fold target grid. Existing efficient selection (ES) rejects losing candidates early, but requires a fully evaluated incumbent and follows a fixed codebook order. We propose global bound-guided exact search (GB-ES), which globally schedules unfinished candidates by their lower bounds and generates exact target-grid samples using on-demand inverse fast Fourier transform (IFFT) evaluation. Completed uniform grids provide bandlimited upper bounds. Comparing one candidate's upper bound



with all rival lower bounds certifies the lexicographic exhaustive-CSM winner. For $L = 16$, GB-ES reduces the mean complex-multiplication and complex-addition counts by approximately 57% relative to ES, and the arithmetic advantage persists across the tested parameter settings.

**14:40-14:55
ET2210**

Paper Title: A Novel Channel Charting-Aided SNR Prediction Method for Multi-Band Integrated Networks

Author(s): Wenyu Zeng, Han Ji, Junling Li, Ayman Radwan, Xiping Wu

Presenter: Han Ji, Purple Mountain Laboratories, China

Abstract: Load balancing (LB) is crucial for multi-band integrated networks, which have the potential to explore complementary advantages of different frequency bands, such as radio frequency (RF) and optical spectra. However, existing LB studies mostly focus on algorithm design without considering the nontrivial lag effect of implementation time, which would significantly compromise network capacity. While SNR prediction can be adopted to enable predictive LB, the state-of-the-art methods usually directly predict future SNR values upon historical SNR sequences, causing the prediction error to be drastically accumulated over time. In addition, those SNR prediction methods are designed for individual frequency bands, failing to exploit the spatial correlation across different bands in multi-band integrated networks. Motivated by this, we propose a novel channel charting-based SNR prediction method. First, a channel charting state space is constructed across different bands to generate Z sequences. Then, an SNR-to-Z sequence encoder followed by a Z sequence predictor are developed and trained upon the Transformer architecture. Finally, a multi-layer perceptron (MLP)-based SNR reconstructor is built to recover SNR values from the predicted Z sequence. Simulation results show that compared with the direct SNR prediction methods, the proposed method can significantly enhance the prediction accuracy for a long-horizon forecasting.

**14:55-15:10
ET4458**

Paper Title: Tensor Decomposition-Based Novel Signal Enhancement for Low-Altitude Spectrum Situation Awareness

Author(s): Yansong Liang, Bin Qi, Wensheng Zhang

Presenter: Yansong Liang, Shandong University, China

Abstract: Low-altitude intelligent networks (LAINs) require reliable spectrum situation awareness (SSA) to support spectrum access and interference management in dynamic electromagnetic environments. Spatial--frequency measurements collected in such networks inherently exhibit multidimensional structures, but are susceptible to noise interference, which degrades the signal-to-noise ratio (SNR) and consequently necessitates effective signal enhancement. To capture the underlying effective signal components and achieve signal enhancement, Tensor Flower (TF) decomposition is employed to characterize the structured spatial--frequency measurements, while proximal alternating



minimization (PAM) is used to alternately update the TF factor matrices. Simulation results demonstrate that the proposed method achieves favorable normalized mean square error (NMSE) and spectral angle mapper (SAM) performance compared with representative tensor decomposition methods, indicating its effectiveness in enhancing multidimensional spatial--frequency signals for low-altitude SSA.

Paper Title: Index-Modulated Phase-Shifter-Aided Spatial Multiplexing: Performance Analysis and Optimization

Author(s): Xinwei Xu, Yue Xiao, Gang Wu, Vladimir Poulkov, Agata Manolova, Ming Xiao

Presenter: Xinwei Xu, University of Electronic Science and Technology of China, China

15:10-15:25
ET3406

Abstract: In this contribution, an index-modulated phase-shifter-aided spatial multiplexing (IM-PSSM) scheme is proposed, in which the baseband antenna index is exploited as an additional information-bearing dimension while the phase shifters convey phase-modulated information. By jointly utilizing antenna-index and phase-shift dimensions, the proposed scheme improves the spectral efficiency (SE) without requiring additional radio frequency (RF) chains and provides enhanced bit error rate (BER) performance. Furthermore, an analytical approximation for the BER of the IM-PSSM system is derived under maximum-likelihood (ML) detection over Rayleigh fading channels. Through maximizing the minimum Euclidean distance (ED) among the received signal candidates, an optimization of the constellation rotation angle is proposed, thereby improving the error performance of the IM-PSSM system. Simulation results demonstrate that the proposed IM-PSSM system outperforms the conventional spatial modulation (SM), quadrature spatial modulation (QSM), and phase-shifter-aided spatial multiplexing (PSSM) schemes under the considered configurations. The optimized rotation scheme further provides a noticeable BER gain over its fixed-angle counterparts.

Paper Title: A Pulse-Shaping Filter Design for OTFS Systems with Multi-Carrier Faster-than-Nyquist Signaling

Author(s): Tianqi Tan, Meng Ma, Yuli Yang, Chaohai Du

Presenter: Tianqi Tan, Peking University, China

15:25-15:40
ET3264

Abstract: Multi-carrier faster-than-Nyquist (MC-FTN) signaling can be integrated into orthogonal time frequency space (OTFS) systems to enhance spectral efficiency through time-frequency (TF) compression, resulting in MC-FTN-OTFS systems. This paper proposes a pulse-shaping filter design for MC-FTN-OTFS systems. The FTN shaping filter is parameterized as a weighted sum of delayed root raised-cosine (RRC) pulses. The weights form a tap vector that is optimized using channel statistical information to maximize the ergodic capacity. To reduce



computational complexity, a surrogate objective for ergodic capacity is formulated on a low-dimensional TF grid covering the dominant interference range. The tap vector is mapped to a variable on the unit-sphere manifold, where a Riemannian gradient ascent algorithm is applied to solve the optimization problem. The optimized pulse-shaping filter attenuates the interference induced by TF compression and doubly selective channels, thereby improving the conditioning of the detection problem and facilitating capacity enhancement. Simulation results indicate that the MC-FTN-OTFS system with the optimized pulse-shaping filter attains an ergodic capacity close to that of the delay-Doppler (DD) domain power allocation with perfect channel state information (CSI), and provides a lower bit error rate than Nyquist-criterion-based OTFS at high signal-to-noise ratios.

Paper Title: Quantum-Assisted Massive MIMO Precoding: A Design Framework and Feasibility Analysis

Author(s): Chengkang Pan, Xinying Li, Shuai Hou, Xian Lu, Fei Wang, Li Yu

Presenter: Chengkang Pan, China Mobile Research Institute, China

15:40-15:55
ET2238

Abstract: This paper presents the first full-stack feasibility analysis of quantum-assisted massive MIMO precoding. We develop a unified framework covering NISQ-compatible VQLS and FTQC-oriented QSVT. Our analysis reveals two measurement bottlenecks: $\mathcal{O}(1/\epsilon^2)$ sampling in variational optimization and $\mathcal{O}(K \cdot \text{polylog}(K/\epsilon^2))$ QST overhead for classical vector extraction. For $(K=128)$, QSVT achieves (97.6%) of classical RZF sum-rate, VQLS (78.3%) ; the complexity break-even occurs at $(K \approx 100)$. These results establish feasibility boundaries and identify pathways for co-designing quantum algorithms with communication-specific optimizations.

TECHNICAL SESSIONS >>>

TS23: Optical Communications and Networks & RF/Microwave Circuits (II)

Session Chair: Xinwei DU, Beijing Normal-Hong Kong Baptist University, China

Time 13:30-15:05 | Oct. 18, 2026

Venue Meeting Room 7

INVITED TALK | 13:30-13:50

Compression Meets Security: Low-Complexity Linear Collaborative Federated Learning with Enhanced Accuracy

Tianshun Wang, Nanjing University of Posts and Telecommunications, China

Abstract: Federated learning (FL) has been regarded as a promising paradigm for enabling distributed model training over resource-limited edge devices. Although FL maintains data locality and enhances model generalization, it faces challenges such as model leakage and pressure from frequent model updates. Some existing schemes, such as differential privacy and model encryption, can partially alleviate these issues while sacrificing the accuracy of the modeling training or increasing the computational overheads in training. To address this issue, we design a low-complexity linear collaborative FL (LCFL) framework to enhance the privacy and accuracy of FL. Specifically, we propose the collaborative secrecy transmission (CST) algorithm by integrating a variant of Shamir's secret-sharing with the model segmentation, which can compresses and encrypts the local models for FL. The decoding complexity of the CST algorithm is only $O(N^3)$ under the compression ratio of N , which reduces the communication overhead and computational complexity. We conduct a quantitative analysis of the model error induced by the CST algorithm and derive its closed-form upper bound. Within LCFL, we formulate an optimization problem to maximize the global model accuracy in wireless FL by optimizing compression ratios, bandwidth allocation, and transmit-powers. Subsequently, we propose a low-complexity algorithm to solve this problem effectively. Numerical simulations demonstrate the efficacy of LCFL in improving FL's accuracy and security, and the results validate the efficiency of the proposed optimization scheme for wireless FL. The source code can be downloaded from the Github: [\url{https://github.com/MinITerence/LCFL}](https://github.com/MinITerence/LCFL).



INVITED TALK | 13:50-14:10

Accelerating LLM Training with Heuristic Partial Optical Reconfiguration

Zuqing Zhu, University of Science and Technology of China, China

Abstract: Optical circuit switching (OCS) represents a most promising building block for future artificial intelligence (AI) clusters, but its prolonged reconfiguration latency restricts the adaptability to highly dynamic AI workloads. In this work, we try to mitigate this gap by pursuing runtime OCS reconfiguration through





asynchronous topology engineering (TPE). Our design partitions OCS ports into on-rail and reconfigurable ones in each communication stage, where the on-rail ports are preconfigured to serve the contemporary demand, while the remaining ones are reconfigured on-the-fly targeting to accommodate the imminent traffic. With such a trade-space-for-time mechanism, we can hide the reconfiguration delay of OCS behind the communications and realize runtime TPE optimization. We formulate an integer linear programming model for solving the asynchronous TPE optimization exactly and also devise a time-efficient heuristic. Extensive simulations confirm that our proposal achieves up to 20.88% reduction in communication time over one-shot TPE.

INVITED TALK | 14:10-14:30

Beyond Traffic Matrix: DELTA – A DAG-Aware OCS Logical Topology Optimization for AIDCs

Weiqliang Sun, Shanghai Jiao Tong University, China



Abstract: The rapid scaling of large language models (LLMs) exacerbates communication bottlenecks in AI data centers (AIDCs). To overcome this, optical circuit switches (OCSs) are increasingly adopted for their superior bandwidth capacity and energy efficiency. However, their reconfiguration overhead precludes intra-iteration topology updates, necessitating a priori engineering of a static topology to absorb time-varying LLM traffic. Existing methods engineer these topologies based on traffic matrices. However, this representation obscures the bursty concurrent bandwidth demands dictated by parallelization strategies and fails to account for the independent channels required for concurrent communication. To address this, we propose DELTA, an efficient logical topology optimization framework for AIDCs that leverages the computation-communication directed acyclic graph (DAG) to encode time-varying traffic patterns into a mixed-integer linear programming (MILP) model, while exploiting the temporal slack of non-critical tasks to save optical ports without penalizing iteration makespan. By introducing a variable-length time interval formulation, DELTA significantly reduces the solution space compared to the fixed-time-step formulation. To scale to thousand-GPU clusters, we design a dual-track acceleration strategy that combines search space pruning (reducing complexity from quadratic to linear) with heuristic hot-starting. Evaluations on large-scale LLM workloads show that DELTA reduces communication time by up to 17.5% compared to state-of-the-art traffic-matrix-based baselines. Furthermore, the framework reduces optical port consumption by at least 20%. Dynamically reallocating these surplus ports to bandwidth-bottlenecked workloads reduces their performance gap relative to ideal non-blocking electrical networks by up to 26.1%, ultimately enabling most workloads to achieve near-ideal performance.



INVITED TALK | 14:30-14:50

Single-Ended OTDR Detection Technology for Hollow-Core Fibers**Tao Yang**, Beijing University of Posts and Telecommunications, China

Abstract: Gas-filling events (GFEs) in hollow-core fibers can create broad-scale humps on OTDR curves, interfering with the identification of weak reflection peaks and small loss steps; dual-ended methods are further constrained by remote access and stable gas conditions. To address this, this report proposes and experimentally validates a single-ended hierarchical identification method that sequentially performs background estimation, hump localization, reflection peak extraction, loss determination, and event classification. Results show good agreement with the dual-ended reference in event statistics, classification, and feature characterization, while requiring no bidirectional curve registration or joint processing, offering easier implementation, better timeliness, and significant application value.

TALK DETAILS

Time	Presentation
14:50-15:05 ET3344	Paper Title: Underwater Optical Two-Way Time Transfer Based on Time-Correlated Single-Photon Counting Author(s): Qianying Chen, Peng Zhang, Dong Hou, Jie Tian, Xianglu Li Presenter: Qianying Chen, University of Electronic Science and Technology of China, China Abstract: We propose and experimentally demonstrate an underwater optical two-way time-transfer method based on time-correlated single-photon counting (TCSPC). The operating principle of TCSPC for underwater time transfer is described, and an underwater transfer system comprising pulsed 520 nm laser sources, single-photon detectors, and field-programmable gate array (FPGA)-based TCSPC delay-measurement units is developed. An indoor platform with an approximately 12 m one-way underwater optical path is constructed for experimental evaluation. During a 30,000 s continuous measurement, the root-mean-square (RMS) fluctuation of the two-way clock offset is approximately 93.3 ps. The time deviation (TDEV) is approximately 10 ps at an averaging time of 1 s and approximately 50 ps near 4000 s. The results show that the proposed method effectively suppresses common-mode delay fluctuations in the underwater link and provides an experimental basis for high-resolution timing measurements under low-light underwater conditions.



TECHNICAL SESSIONS >>>

TS24: Internet-of-Things, Sensor Networks and Edge Computing (II)

Session Chair: Chenglong Li, National University of Defense Technology, China

Time 16:00-18:00 | Oct. 18, 2026

Venue Meeting Room 1

TALK DETAILS

Time	Presentation
16:00-16:15 ET2209	Paper Title: Event-Based Distributed Fusion Filtering for Multi-Sensor Systems with Sensor Failures Author(s): Zhibin Hu, Tana Guo, Jing Zhang, Jiashuo Zhang, Wenran Zhang Presenter: Tana Guo, Jining Normal University, China Abstract: In this paper, the design issue of the distributed fusion (DF) filter is investigated for a class of multi-sensor (MS) nonlinear systems with sensor failures under the event-triggered mechanisms (ETMs). A series of random variables is used to describe the phenomenon of sensor failures. To alleviate network resource consumption, the ETMs is adopted in the network channel between the local sensor and the filter. The primary objective of this paper is to developed a local filter for MS nonlinear systems with sensor failures and ETMs. Then, the local covariances of the filtering error are computed and the corresponding upper bounds (UBs) are derived. Moreover, the obtained UBs is minimized via the designing the filter gain. Furthermore, according to the foregoing local results and the inverse covariance intersection fusion rule, the fusion filter is presented. Finally, use a numerical example to demonstrate the validity of the developed DF filtering approach.
	Paper Title: HD-TCN: Hierarchical Dilated Temporal Convolutional Networks with Multi-View Learning for Early-Stage Encrypted Malware Traffic Detection Author(s): Yixin Jiang, Wenqian Xu, Kaitian Huang, Yiwei Yang, Yunan Zhang, Leyu Bi, Chao Hong, Shituo Ma, Yiming Zhang Presenter: Zhihao Zheng, China Southern Power Grid Company Limited, China Abstract: Encrypted traffic classification poses a significant challenge to intrusion detection systems, as payload encryption renders deep packet inspection ineffective. Early-stage detection, i.e., identifying flows using only the first few packets, is essential yet under-explored, and large deep learning models incur inference latency bottlenecks that equally limit their deployment in high-speed networks. This paper presents HD-TCN, a Hierarchical Dilated Temporal Convolutional Network that reformulates early-stage malware traffic detection as a multi-view sequence modeling problem. The model decomposes flow prefixes



into three complementary views: a main branch capturing core behavioral patterns via stacked dilated residual TCN blocks, an auxiliary branch modeling local temporal context, and a protocol branch encoding sparse transport-layer and TLS state indicators through a compact multilayer perceptron, fused by a learnable gated mechanism. Experiments on CTU-13 and USTC-TFC2016 under 20% to 50% early-stage ratios demonstrate that HD-TCN consistently achieves the highest macro-F1, with the largest gains at the sparsest 20% setting where multi-view complementarity is most critical. Ablation confirms every component's contribution, at 113K parameters and ~0.13 ms per-flow inference latency.

**16:30-16:45
ET2188**

Paper Title: Vehicle Clustering and Resource Scheduling Scheme Based on Collaborative Perception of Wireless Resources

Author(s): Jingbin Lu, Zhonghui Pei, Long Xie, Zhengxiong Hu, Run Wang, Yuntao Wu

Presenter: Jingbin Lu, Wuhan Institute of Technology, China

Abstract: Cellular Vehicle-to-Everything(C-V2X) sidelink communication allows autonomous resource selection via distributed scheduling without base station coverage. However, the limited perception of wireless resources may lead to resource allocation conflicts, especially when wireless resources are relatively scarce. In this paper, we propose a distributed clustering and resource scheduling scheme based on collaborative perception of wireless resources. The scheme innovatively integrates wireless resource sensing states into the clustering process. Based on the constructed vehicle clustering structure, the cluster heads fuse the distributed perception data of wireless resources from cluster members to generate more accurate collaborative perception results of the environment where the clusters are located, so as to support more reliable resource scheduling and reduce resource allocation conflicts. Simulation results show that the proposed scheme achieves higher topological stability than conventional clustering schemes based solely on mobility, and superior communication performance compared to the autonomous resource allocation mechanism of C-V2X.

Paper Title: Minimum Data Volume Maximization for Integrated Sensing and Communication in NOMA-Assisted Marine IoT Networks

Author(s): Qianru Wang, Liping Qian, Lian Zhao, Yuan Wu

Presenter: Qianru Wang, Sun Yat-sen University, China

**16:45-17:00
ET3299**

Abstract: Integrated sensing and communication (ISAC) offers a viable technical approach to support efficient data transmission and sensing tasks in marine IoT (MIoT) networks.

However, uncrewed aerial vehicle (UAV) targets in marine environments suffer severe position uncertainty, which reduces the effective radar sensing rate and impairs reliable data transmission. This paper therefore investigates the ISAC framework in non-orthogonal multiple access (NOMA)-assisted MIoT systems,



where the base station (BS) simultaneously receives data from uncrewed surface vehicles (USVs) via NOMA and performs radar sensing for a UAV target. Under the energy consumption limits and sensing performance constraints, we conduct the joint optimization of USVs' transmit power, BS's transmit beamforming strategy, and UAV's flight path to maximize the minimum data volume transmitted across all USVs. The established optimization problem belongs to a strongly non-convex formulation, and thus it is difficult to solve. Therefore, we design an effective optimization algorithm relying on hierarchical decomposition and the soft actor-critic (SAC) framework. Simulation results demonstrate that the designed NOMA-supported maritime ISAC scheme achieves superior performance to several benchmark methods.

**17:00-17:15
ET4477**

Paper Title: Self-Adaptive-ACO-Based Energy-Efficient Clustering Algorithm for Two-Tier UAV-Assisted Data Collection in Wireless Sensor Networks
Author(s): Yukun Sun, Ping Zhu, Xin Li, Chong Zhang, Yang Liu, Fu Wang
Presenter: Yukun Sun, Beijing Institute of Aerospace Microsystems and Information Technology, China

Abstract: To address the challenges of limited onboard energy, imbalanced cluster loads, and inefficient communication resource of wireless sensor network, this paper proposes an energy-efficient two-tier data collection architecture for the UAV swarms. The architecture integrates three complementary algorithms, thus energy- density-aware clustering, adaptive intra-cluster route planning, and multi-objective inter-cluster path optimization. Firstly, an energy-density-aware clustering algorithm combines residual node energy with local node density to elect robust cluster heads and balance workloads among cooperative UAVs. A self-adaptive ant colony optimization algorithm then adaptively adjusts pheromone, heuristic, and evaporation parameters according to cluster density, incorporating 2-opt local search and early convergence detection to improve intra-cluster route quality. Finally, a multi-objective particle swarm optimization algorithm minimizes total traveling distance and balances single-segment distance to optimize the aggregating UAV tour. We build a testbed to validate the proposed algorithm. Simulation results demonstrate that the proposed algorithms reduce normalized energy consumption by approximately 17.2% and mission completion time by approximately 17.6% compared with the baseline algorithm, while improving cluster load balance by over 60%.

**17:15-17:30
ET1039**

Paper Title: A Lyapunov-Guided Heterogeneous Task Scheduling Approach for IoT-Edge Computing
Author(s): Tao Zhang, Liang Tang, Wei Wang, Zhaohui Li, WeiQuan Wang, Yongmin Zhang
Presenter: Wei Wang, Central South University, China

Abstract: Heterogeneous task scheduling in IoT-edge computing systems faces



fundamental challenges arising from dynamic workloads, resource heterogeneity, and complex task dependencies modeled as Directed Acyclic Graphs (DAGs). Existing approaches either rely on static configurations that mismatch with heterogeneous demands or lack theoretical guarantees for long-term queue stability under unpredictable task arrivals. This paper proposes a Lyapunov-guided multi-agent deep reinforcement learning framework for dynamic task scheduling in heterogeneous edge environments. We employ Lyapunov drift-plus-penalty theory to transform the long-term stochastic optimization problem into tractable per-slot sub-problems, and introduce Lyapunov-MARL, which integrates Lyapunov optimization with Multi-Agent Deep Deterministic Policy Gradient to solve these subproblems under a centralized training with decentralized execution paradigm. The Lyapunov drift term is embedded into the reward function to implicitly ensure queue stability through reward shaping. Extensive simulations demonstrate that the proposed framework achieves significant reduction in maximum completion time compared to baselines, while maintaining strong queue stability under dynamic DAG workloads.

Paper Title: A Neural Network Compression Scheme Based on Tensor Decomposition for Edge Devices in Low-Altitude Intelligent Networks

Author(s): Zhaoying Hao, Bin Qi, Yi Chi, Yansong Liang, Wensheng Zhang, Jian Sun
Presenter: Zhaoying Hao, Shandong University, China

17:30-17:45
ET2202

Abstract: Deep learning has demonstrated exceptional feature extraction capabilities, making it highly promising for complex tasks at the edge of Low-Altitude Intelligent Networks (LAINs) represented by Unmanned Aerial Vehicles (UAVs). However, driven by the need to solve increasingly complex practical challenges, model sizes have expanded correspondingly, bringing about massive computational overhead and memory demands. This makes deploying traditional high-performance models on resource-constrained edge devices challenging. Since the massive parameter tensors in deep networks exhibit inherent redundancy and low-rank characteristics, tensor decompositions can effectively factorize them into multiple small-scale, low-order latent factors. Building upon this, we propose a neural network compression scheme based on Canonical Polyadic (CP) and Tensor Ring (TR). This scheme mitigates parameter redundancy while maintaining performance, offering an efficient and reliable lightweight solution for deploying neural networks on edge devices. Furthermore, we derive the corresponding back-propagation formulas for the proposed scheme, enabling end-to-end training. Simulation results indicate that the proposed scheme can achieve effective parameter compression with an acceptable accuracy loss, while demonstrating robust convergence during the end-to-end training process.

17:45-18:00
ET1036

Paper Title: Joint Pricing and Offloading for Three-Tier MEC Networks: A Stackelberg Game Approach

Author(s): Jingwen Weng, Huijun Huang, Nan Sun, Wei Wang, Zhaohui Li, Yongmin



Zhang, and Tao Zhang

Presenter: Jingwen Weng, Central South University, China

Abstract: With the proliferation of computation-intensive and latency-sensitive applications, user-edge-cloud collaboration has become a promising paradigm for providing high-quality computing services. However, the distinct operating entities in this hierarchical architecture introduce coupled interests and decisions among end users, edge servers, and cloud servers, making resource management and load balancing challenging. To address this issue, this paper investigates a three-tier MEC framework that jointly considers user task offloading, edge service pricing, cloud resource leasing, and edge-cloud resource collaboration. We formulate the interactions among the MEC server, cloud server, and users as a one-leader multi-follower Stackelberg game. The MEC server jointly determines the service price charged to users and the wholesale price offered to the cloud, while the cloud and users respond through resource provisioning and offloading decisions. We establish the existence and uniqueness results required for follower responses and the operating point, and develop SEGA to compute a stationary equilibrium solution. Simulations show rapid convergence and improved profitability over benchmark schemes.

TECHNICAL SESSIONS >>>

TS25: AI for Communications and Networks (III)

Session Chair: Xiaoqian Li, The University of Electronic Science and Technology of China

Time 16:00-17:35 | Oct. 18, 2026

Venue Meeting Room 2

INVITED TALK | 16:00-16:20

Quantum GNN-LLM for Multi-Vehicle Trajectory Prediction in Multi-BS ISAC System

Fei Li, Nanjing University of Posts and Telecommunications, China

Abstract: Quantum graph neural network (QGNN) models combine topology-aware graph modeling with quantum state evolution to enable more explicit modeling of higher-order interactions than classical graph neural networks. Combining a QGNN with a large language model (LLM) uses the LLM's pretrained sequence-modeling capabilities to capture long-term motion dependencies conditioned on higher-order interactions. Multi-vehicle trajectory prediction accounts for how vehicles influence one another, helping anticipate traffic conflicts and support coordinated driving. Despite recent advances, jointly modeling higher-order vehicle interactions and motion histories remains challenging for trajectory prediction from noisy state estimates in multi-base-station integrated sensing and communication (multi-BS ISAC) systems. To address this challenge, we propose a QGNN-LLM framework that integrates quantum higher-order interaction modeling with LLM-based temporal modeling for multi-vehicle trajectory prediction. The QGNN extracts interaction features from vehicle pairs and triplets through graph-conditioned Hamiltonian evolution, guiding the LLM to model motion histories and capture temporal dependencies conditioned on joint vehicle interactions. Simulation results show that QGNN-LLM reduces average displacement error (ADE) and final displacement error (FDE) by 5.19% and 5.00%, respectively, compared with a classical GNN-LLM baseline, demonstrating the effectiveness of integrating quantum higher-order interaction modeling with LLM-based temporal modeling.



TALK DETAILS

Time	Presentation
16:20-16:35 ET1042	Paper Title: Towards an In-Network Computing Fabric for AI-Native 6G Author(s): Qiao Qiao, Yuxiang Shang, Tao Sun, Qian Zhang, Jie Jiang, Xin Xie, Jiachen Yang Presenter: Qiao Qiao, Tianjin University, China



Abstract: Facing the core challenges of heterogeneous resource coordination and high scheduling complexity under dynamic network conditions when AI-native 6G networks support large-scale distributed AI training and real-time inference, this paper proposes a novel in-network computing (INC) architecture as a fundamental enabler for the deep integration of 6G and AI. Specifically, this work systematically categorizes INC into three complementary modes — explicit, implicit, and customized — each offering distinct trade-offs among programmability, transparency, and performance to match diverse 6G service requirements. To coordinate heterogeneous 6G resources, we formulate INC scheduling as a DAG optimization problem that jointly captures computation and communication dependencies, and is provably NP-hard. We then design reinforcement learning-driven scheduling algorithms that efficiently approximate near-optimal solutions under dynamic network conditions. Experimental evaluations demonstrate that the proposed framework outperforms existing schemes in convergence speed, task makespan, and communication overhead, effectively reducing end-to-end latency and system energy consumption. This work provides a generalizable architectural foundation and scheduling paradigm for the convergence of computility and networking in future intelligent networks.

Paper Title: KAN-MTSC: KAN-Driven Multi-Task Semantic Communications with Unified Utility Optimization

Author(s): Xiaoning Wang, Jingyu Hu, Jiawen Kang, Jiahao He, Wenjun Xu, Ping Zhang

Presenter: Xiaoning Wang, Beijing University of Posts and Telecommunications, China

**16:35-16:50
ET2234**

Abstract: Semantic communications have achieved remarkable advances and evolved into a highly promising communication paradigm for 6G networks. A general trend in recent learning-based semantic communication frameworks is to employ neural networks with fixed activation functions as the semantic coding backbone, whose limited nonlinear representation capability inherently constrains semantic feature learning and degrades semantic transmission performance. In this paper, we introduce the Kolmogorov--Arnold Network (KAN) into multi-task semantic communications for the first time and propose KAN-based Multi-Task Semantic Communications (KAN-MTSC) for multiple heterogeneous semantic tasks. In addition, a unified semantic utility metric is developed together with a joint resource optimization strategy between communication and computing to maximize overall system utility. Extensive experimental results demonstrate that the proposed KAN-MTSC consistently outperforms conventional semantic communication frameworks employing fixed activation functions across heterogeneous semantic tasks, while the proposed resource optimization strategy further improves the overall system utility by up to 20%.

16:50-17:05

Paper Title: A Temporal Network Traffic Representation Method for Quality-of-

**ET3374**

Experience Inference in Live Streaming Services

Author(s): Xinyi Wang, Xin Li, Yongli Zhao, Jie Zhang

Presenter: Xinyi Wang, Beijing University of Posts and Telecommunications, China

Abstract: Encrypted transport prevents network-side systems from directly observing playback stalls and video resolution in live streaming services. This paper proposes TTQ-Net, a temporal network traffic representation method for quality of experience (QoE) inference from encrypted traffic. TTQ-Net builds chronological traffic-window sequences within each collection experiment and uses one-dimensional temporal convolution to capture short-term traffic evolution for stall detection and resolution classification. Experiments on Bilibili, Douyin, and TikTok traffic show that TTQ-Net consistently outperforms logistic regression, random forest, and XGBoost in stall detection, improving macro F1-score by 2.40--3.29 percentage points over the strongest conventional baseline. It also achieves competitive resolution classification performance. Further analysis shows that temporal context is beneficial but non-monotonic, and the best sequence length varies across platforms and tasks.

Paper Title: From Natural-Language Intent to Physical Radio Signals: Deterministically Validated Generation

Author(s): Lan Zhang, Biao Zhang, Yuxuan Zhou, Junjie Hu

Presenter: Lan Zhang, The 36th Research Institute of CETC, China

**17:05-17:20
ET3421**

Abstract: Tool-using large language models (LLMs) translate natural-language instructions into structured calls, while software-defined radio (SDR) platforms synthesize waveforms from explicit parameters. Direct integration is unreliable because valid-looking calls may violate physical limits, exceed available capabilities, or request unauthorized actions. We introduce a controlled architecture with four deterministic stages covering schema and data types, numerical and physical constraints, capabilities and resources, and execution authority. Accepted configurations are synthesized for offline inspection and controlled replay; rejected requests receive constraint-specific feedback. All 40 constructed invalid requests were rejected at their intended stages. Across 30 matched English-Chinese scenarios (60 re-requests), capability-aware prompting raised request-to-waveform correctness from 33.3% to 83.3%; an exact two-sided McNemar test confirmed the paired difference ($p = 1.86 \times 10^{-9}$). Cabled-loopback measurements of accepted QPSK, 16QAM, and OFDM signals yielded root-mean-square error vector magnitude (EVM) values of 6.461%–9.052% with no observed symbol errors. The architecture establishes an auditable path from natural-language intent to physical-signal generation while separating request correctness, authorization, and radio-frequency quality.

**17:20-17:35
ET4519**

Paper Title: Dynamic Routing Protocol with Reinforcement Learning for Terahertz Nanonetworks



Author(s): Weitang Lin, Wenhui Tang

Presenter: Weitang Lin, Guangzhou University, China

Abstract: Nanonetworks enable emerging biomedical applications by supporting information exchange among nanoscale devices. As a key physical-layer technology, terahertz (THz) electromagnetic communication offers ultra-high data rates and low latency, making it well suited for in-body nanonetwork scenarios. However, the extremely limited energy budget and communication range of nanonodes, together with node mobility, render multi-hop routing highly challenging in dynamic THz nanonetworks. To address this problem, this paper proposes a dynamic routing protocol based on deep deterministic policy gradient (DDPG). The routing decision process is formulated within a deep reinforcement learning (DRL) framework, where real-time node attributes, including residual energy, position, and velocity, are modeled as continuous states, and relay preference is represented by a continuous action vector. An actor-critic dual-network structure with experience replay is employed to learn adaptive relay forwarding policies. Simulation results demonstrate that the proposed DDPG-based routing protocol achieves improved time efficiency and reduced energy consumption compared with representative model-based routing schemes, indicating its effectiveness in dynamic THz nanonetwork environments.

TECHNICAL SESSIONS >>>

TS26: Space-Air-Ground Communication and Space Networking (III)

Session Chair: Dongdong Wang, National Key Laboratory of Advanced Communication Networks, China

Time 16:00-17:50 | Oct. 18, 2026

Venue Meeting Room 3

INVITED TALK | 16:00-16:20

Investigation on Air Interface Autonomous Evolution in LEO Satellite Networks

Dongdong Wang, National Key Laboratory of Advanced Communication Networks, China

Abstract: AI-native RAN has emerged as a foundational and defining technical paradigm of 6G systems, and the AI-native air interface acts as the core enabler for the endogenous intelligent evolution of wireless networks. As a critical component of 6G space-air-ground integrated networking, LEO satellite internet presents distinct features: dynamically evolving service coverage, highly time-varying link characteristics, and diversified terminal and service types. The traditional static air interface design paradigm, built on manually predefined rules, lacks inherent flexibility. Deployed in LEO satellite scenarios, it faces high adaptation complexity and elevated deployment costs, and cannot accommodate the complex, dynamic demands of global communication. Constructing an evolvable air interface with autonomous adaptation and dynamic optimization capabilities via artificial intelligence is the core technical pathway to resolve the communication adaptation bottleneck of LEO satellite internet. Currently, academia, industry and international standardization bodies have carried out extensive research and standardization efforts on intelligent air interface technologies. Nevertheless, most existing outcomes target traditional terrestrial communication scenarios. Targeted research on two key technical directions—generative waveform technology for the complex and dynamic propagation environment of LEO satellites, and autonomous evolution resource orchestration and scheduling technology based on multi-agent interaction—remains relatively limited, and the field as a whole is still in an early exploratory stage. This report delivers in-depth analysis and systematic consolidation of the two aforementioned core technical directions, extracts their technical essence, scenario adaptation logic and key bottlenecks to be addressed, and puts forward targeted assessments and insights. It aims to clarify the technical roadmap and evolution direction of AI-native air interface autonomous evolution in LEO satellite internet scenarios, and provide a reference for subsequent technical breakthroughs and engineering exploration.





TALK DETAILS

Time	Presentation
16:20-16:35 ET2197	Paper Title: Collaborative Tunable Beam Hopping and Resource Allocation for Coexisting LEO-GEO Networks Author(s): Zhe Zhong, Haomin Wang, Jinfeng Zhang, Yong Li Presenter: Zhe Zhong, Beijing University of Posts and Telecommunications, China Abstract: The coexistence of geostationary earth orbit (GEO) satellites and low earth orbit (LEO) constellations in the Ku/Ka bands enables flexible service augmentation but also introduces severe co-frequency interference. Beam hopping (BH) is an effective interference avoidance technique that enables dynamic beam illumination control in both temporal and spatial domains. However, existing BH-based coexistence schemes usually adopt simplified spatial service representations and insufficiently exploit the coupling among beam scheduling, transmit power, and beamwidth adjustment. To address these issues, this paper proposes a collaborative tunable BH resource allocation scheme for coexisting LEO-GEO networks. A dual-granularity cell partitioning scheme is first introduced, where coarse-grained cells characterize GEO wide-area coverage and fine-grained cells capture LEO spot-beam service demands. For the primary GEO system, a joint optimization problem is formulated to maximize system capacity by jointly optimizing BH scheduling, transmit power, and 3dB beamwidth, which is solved through a three-stage decoupled framework. For the LEO system, dynamic interference exclusion zones are derived from the GEO BH pattern, and a priority-based greedy scheduling algorithm is developed to maximize weighted traffic satisfaction under GEO protection constraints. Simulation results demonstrate that the proposed scheme improves GEO system capacity while maintaining a high traffic satisfaction rate for LEO system in interference-limited coexistence scenarios.
16:35-16:50 ET2204	Paper Title: Digital Twin-Assisted Online Resource Allocation for Service Continuity in Non-Terrestrial Networks Author(s): Xinyu Huang, Yiren Zhou, Hiroaki Hashida, Mingcheng He, Xue Qin, Conghao Zhou, Weihua Zhuang, Xuemin (Sherman) Shen Presenter: Conghao Zhou, Xidian University, China Abstract: In this paper, we propose a novel digital twin (DT)-assisted resource allocation framework for non-terrestrial networks, aiming to enhance service continuity through region-level queue stabilization while reducing radio spectrum bandwidth and transmit power consumption. Particularly, we construct channel and traffic DTs to infer beam-to-region channel states and regional traffic demand, and leverage short-horizon coverage prediction to capture future service availability. We



estimate the effective channel states and traffic demand by incorporating DT uncertainty for resource allocation. We then formulate a long-term resource minimization problem of beam-level bandwidth and transmit power allocation under queue-stability and service rate constraints. To solve the problem, we develop a real-time resource allocation algorithm to prioritize regions based on queue backlog, DT uncertainty, and interruption risk, and to optimize resource allocation at each time slot through alternating convex optimization. Trace-driven simulations using Starlink orbital data, weather-related channel impairment, and heterogeneous regional traffic show that the proposed framework improves service continuity and resource efficiency compared to representative queue-based, coverage-aware, and load-balancing baselines.

Paper Title: WGSABR: Weather-Gated Residual Control for Safe Adaptive Bitrate Streaming over LEO Satellite Links

Author(s): Guojin Pei, Hongjun Xie, Penghui Sun

Presenter: Guojin Pei, Shanghai Interstellar Glory Space Computing Technology Co., Ltd., China

**16:50-17:05
ET3415**

Abstract: Low-Earth-orbit (LEO) satellite links combine high capacity with abrupt throughput variation, while weather offers informative but noisy side information. We present Weather Gated Safe Adaptive Bitrate (WGSABR), a guarded context adaptation of a risk-trained SafeSABR policy. WGSABR freezes the same-seed 25-dimensional anchor actor, appends 27 causal weather and network features, and learns a bounded monotone residual that suppresses high-rate actions only when network or player-state evidence corroborates risk. On 23,980 held-out WetLinks sessions, WGSABR retains 99.997% of SafeSABR's mean quality of experience (QoE) and, among the evaluated learned policies, attains the lowest mean and P95 rebuffering and severe-session rate. Compared with Comyco, WGSABR improves mean QoE by 4.215 points (95% CI [3.730,4.705]), reduces mean rebuffering by 0.729 s (60.7%), and lowers the severe-session rate from 24.480% to 10.874%. Relative to SafeSABR, mean rebuffering falls by 1.06 ms overall and 13.97 ms in the empirically defined high-rain stratum, with only a 0.011 mean-QoE reduction. Bidirectional zero-target-calibration transfer reproduces 11.31 14.84 ms high-rain reductions. Controlled ablations identify weather-specific risk allocation, while its P95 local policy-path latency is 1.32 ms (sensor acquisition and network I/O excluded).

Paper Title: Cooperative Coverage in Space-Air Integrated Networks: Energy-Aware UAV Trajectory Optimization

Author(s): Xintong Li, Feng Wang, Chenxi Liu, Lidong Zhu

Presenter: Xintong Li, University of Electronic Science and Technology of China, China

**17:05-17:20
ET3322**

Abstract: Low Earth Orbit (LEO) satellite constellations are emerging as a key



infrastructure for wide-area and low-latency communications. However, standalone LEO satellite access may still experience uneven service quality due to time-varying satellite-user geometry and Line-of-Sight (LoS) conditions. To enhance system coverage, uncrewed aerial vehicles (UAVs) can serve as flexible aerial supplementary nodes, but their effective use requires trajectory optimization under coupled channels, satellite mobility, and limited UAV energy. Nevertheless, energy-aware UAV trajectory optimization for cooperative LEO-UAV coverage remains insufficiently studied. To tackle this issue, we propose a graph neural network (GNN)-assisted twin delayed deep deterministic policy gradient (TD3) framework for energy-aware UAV trajectory optimization. The GNN extracts topology-aware state representations, and TD3 optimizes continuous UAV velocity control. Simulation results demonstrate faster convergence, higher energy efficiency, and a better throughput-energy trade-off than benchmark schemes.

Paper Title: Cooperative Beam and Resource Scheduling in LEO Satellite Networks: A Graph-Enhanced Multi-Agent Reinforcement Learning Approach

Author(s): Yuejia Liu, Haoye Chai, Longyu Zhou, Mugen Peng

Presenter: Yuejia Liu, Beijing University of Posts and Telecommunications, China

**17:20-17:35
ET3357**

Abstract: With the rapid expansion of low earth orbit (LEO) satellite constellations, satellite-terrestrial communications are able to provide high-capacity and wide-area coverage. However, they also suffer from uneven traffic distribution and severe co-channel interference. To address these challenges, we propose a joint optimization approach for beam hopping and resource allocation through multi-satellite cooperation, aiming to maximize system throughput and minimize queueing delay. To tackle the challenges of complex multi-satellite cooperation and high-dimensional resource allocation in LEO satellite networks, a multi-agent proximal policy optimization (MAPPO) approach is developed. Specifically, the proposed method models complex satellite-terrestrial relationships as a bipartite graph and incorporates the graph neural network (GNN) to enhance the ability for topological information extraction and collaborative dynamic resource optimization. In this framework, each satellite cooperates with its neighboring satellite to make decisions, significantly reducing communication overhead. Simulation results demonstrate that the proposed method outperforms other existing methods. It achieves a performance gain of 10.21% compared to the MAPPO method without inter-satellite cooperation.

**17:35-17:50
ET3318**

Paper Title: Traffic-Aware Domain Partitioning and Load-Balanced Inter-Domain Routing for LEO Satellite Networks

Author(s): Chen Zhou, Jiangtao Luo, Yongyi Ran

Presenter: Chen Zhou, Chongqing University of Posts and Telecommunications, China

Abstract: Low Earth Orbit (LEO) satellite networks provide



global coverage and low latency, yet high node mobility, uneven traffic distribution, and stochastic link failures pose severe challenges for inter-domain routing. Existing approaches either neglect graph-structured topology or lack dynamic awareness of real-time link states, struggling to balance load distribution and routing reliability. This paper proposes DTAR, a traffic-aware deep reinforcement learning approach for inter-domain routing in LEO satellite networks. A multi-objective NSGA-II algorithm first generates an offline domain partition, which maximizes intra-domain traffic ratio and minimizes load imbalance. A graph attention network (GAT) dynamically encodes inter-domain link traffic intensity, load distribution, and fault status, upon which an action-masked proximal policy optimization (PPO) agent makes routing decisions online. Simulations on a 288-satellite Walker constellation against multiple baselines demonstrate that DTAR consistently reduces link load imbalance and end-to-end delay, while improving routing success rate and reducing packet loss rate across normal, traffic surge, and fault scenarios. Index Terms—LEO satellite network, inter-domain routing, graph attention network, deep reinforcement learning

TECHNICAL SESSIONS >>>

TS27: Integrated Sensing and Communication (II)

Session Chair: Chen Huang, Purple Mountain Laboratories & Southeast University, China

Time 16:00-17:50 | Oct. 18, 2026

Venue Meeting Room 4

INVITED TALK | 16:00-16:20

Mid-Infrared Hyperspectral Chaos Lidar

Han Wu, Sichuan University, China

Abstract: Chaos LiDAR enables unambiguous ranging with superior anti-jamming properties, though its applications have been primarily demonstrated in the near-infrared region. Leveraging the excellent atmospheric transparency, strong resistance to scattering and turbulence, and the molecular fingerprint characteristics of the mid-infrared (MIR) wavelengths, MIR chaos LiDAR could be particularly advantageous for achieving unambiguous ranging and remote sensing. However, the lack of broadband chaotic light and fast photodetectors in the MIR region hinders the realization of high-performance MIR chaos LiDAR. Here, we demonstrate, for the first time to the best of our knowledge, a frequency conversion-based MIR chaos LiDAR that employs a novel MIR chaos laser generated via frequency down-conversion of near-infrared random fiber laser and the up-conversion chaos detection. The approach facilitates the generation of a wavelength-tunable MIR laser with a large chaos bandwidth, enabling MIR hyperspectral chaos LiDAR operating in the spectral range of 3330–3390 nm within the 3–5 μm atmospheric window that integrates centimeter-level high-resolution ranging and spectroscopy, highlighting its potential for remote sensing applications. This work provides a new paradigm for high-resolution ranging and hyperspectral imaging in arbitrary spectral regions where broadband chaos light generation and detection are challenging.



TALK DETAILS

Time	Presentation
16:20-16:35 ET1085	Paper Title: Multi-Cell Coordinated Beamforming for ISAC: A Power Minimization Perspective Author(s): Zichao Wang, Jun Zhang, Yan Cai, Yi Wu Presenter: Zichao Wang, Nanjing University of Posts and Telecommunications, China
	Abstract: We study transmit-power minimization for a multi-cell multi-user integrated sensing and communications (ISAC) network under coordinated beamforming (CoBF), in which linear precoding directions and power allocation are



jointly designed to satisfy communication signal-to-interference-plus-noise ratio(SINR) and base-station (BS)-side sensing SINR constraints. We consider imperfect channel state information (CSI) and adopt a large-system regime in which the number of cells is fixed, whereas the numbers of transmit antennas and users per cell grow with a bounded nonzero loading ratio. Using large-dimensional random matrix theory (RMT), we derive deterministic equivalents for the Lagrange multipliers and cell-level/per-user transmit powers, which replace instantaneous small-scale-channel-dependent quantities with fixed-point and linear-system expressions governed by large-scale fading, CSI quality, SINR targets, and sensing geometry. Our analysis shows that sensing constraints introduce a structured spatial term into the CoBF design, thereby revealing the power tradeoff between communication-only CoBF and ISAC-CoBF. Numerical results demonstrate the effects of the required user rate, CSI uncertainty, number of antennas, and sensing requirements on the average transmit power.

Paper Title: Adaptive Cluster Selection for Cooperative Sensing in 6G Networks

Author(s): Wenxiao Guo, Zixiang Han, Jing Jin, Jingbo Tan, Yahui Xue, Guangyi Liu, Jintao Wang

Presenter: Wenxiao Guo, Tsinghua University, China

16:35-16:50
ET1096

Abstract: This paper studies dynamic sensing cluster selection in an OFDM-based cooperative integrated sensing and communication (ISAC) system for mobile target tracking. A closed-form Cramer–Rao lower bound (CRLB) for joint position–velocity estimation is derived from time-delay and Doppler measurements, and then transformed into a scalar metric with a unified dimension to serve as the optimization criterion. To address the challenge of sensing receiver selection, a two-stage algorithm is proposed, which combines simulated annealing for robust initial cluster design with sequential search (SS) for tracking-aware adaptive refinement, enabling the sensing cluster to be continuously updated during target tracking. Simulation results show that the proposed method significantly outperforms alternative selection strategies. For position estimation, it reduces the error by 7.9% and 41.9% compared to fixed and power-based selection, respectively. For velocity estimation, the improvements are even more significant, achieving reductions of 19.3%, 35.4%, and 77.0% against the SS, fixed, and power-based methods.

16:50-17:05
ET2230

Paper Title: Fairness-Oriented Secure Transmission Design for RSMA-Aided Bistatic ISAC Systems

Author(s): Xinpei Chen, Fuhao Liu, Quanyu Chen, Yunshen Guo, Jiansong Miao

Presenter: Xinpei Chen, Beijing University of Posts and Telecommunications, China

Abstract: Integrated sensing and communication (ISAC) is now widely viewed as an enabling framework for future wireless networks, due to its ability to simultaneously provide communication services and sensing functionality.



However, safeguarding physical layer security (PLS) while maintaining robust sensing performance in open environments remains a critical challenge. This difficulty is further amplified in multi-user scenarios, where severe inter-user interference and limited resources significantly constrain the system's secrecy performance. To address these issues, we propose a secure bistatic ISAC system enabled by Rate-Splitting Multiple Access (RSMA), where the transmitter and radar receiver are spatially separated. While satisfying sensing constraints, we jointly optimize the transmit beamforming and common rate allocation to maximize the minimum secrecy rate among users, thereby explicitly ensuring multi-user fairness. To tackle the resulting highly non-convex optimization problem, we leverage Semidefinite Relaxation (SDR) and Successive Convex Approximation (SCA) to transform it into a series of tractable Semidefinite Programming (SDP) sub-problems. Simulation results demonstrate that the proposed RSMA-aided scheme achieves better communication security than conventional baselines while effectively satisfying the sensing precision requirements.

Paper Title: Sensing-Centric Joint Beamforming and Power Allocation for AFDM Near-Field ISAC Systems

Author(s): Rongbin Shang, Chongwen Huang, Haifan Yin, Li Wei

Presenter: Rongbin Shang, Zhejiang University, China

**17:05-17:20
ET2244**

Abstract: Conventional Integrated Sensing and Communications (ISAC) frameworks in extremely large-scale MIMO (XLMIMO) networks suffer from far-field model mismatches and typically rely on suboptimal separate designs. To circumvent these bottlenecks, this paper proposes a structurally rigorous sensing-centric joint beamforming and power allocation frame for near-field ISAC systems employing Affine Frequency Division Multiplexing (AFDM). Specifically, we derive the exact Fisher Information Matrix (FIM) and reveal that the nearfield AFDM framework admits an explicit cross-term structure that aggregates spatial wavefront curvature and temporal delay information. Unlike grid-based waveforms, AFDM operates via a continuous Discrete Affine Fourier Transform (DAFT) kernel, effectively suppressing energy leakage and enabling a clean derivation of the FIM. By formulating a weighted Cramer-Rao Bound minimization problem governed by stringent multiuser Quality-of-Service constraints, we optimize the full spatial covariance matrices and subcarrier power allocation, yielding a convex semidefinite program formulation. An alternating optimization method tackles the beamforming and power allocation. Numerical simulations demonstrate that the proposed design effectively alleviates the near-field distance estimation bottleneck, yielding a substantial localization gain of approximately 7 dB over the far-field-mismatched design, while providing an order-of-magnitude Bit Error Rate reduction compared to conventional OFDM.

**17:20-17:35
ET3332**

Paper Title: A Hybrid CNN-Transformer Architecture for Environment-Independent WiFi Fall Detection



Author(s): Yingzhe Wang, Cunhua Pan, Ruijing Liu, Shaokai Li, Hong Ren, Jiangzhou Wang

Presenter: Yingzhe Wang, Southeast University, China

Abstract: Device-free fall detection using WiFi Channel State Information (CSI) is a promising privacy-preserving solution for elderly health monitoring, but deep learning models often degrade under cross-room domain shifts and Non-Line-of-Sight (NLoS) propagation. We propose a target-free fall-detection pipeline that couples instance-level amplitude normalization, physics-aware augmentation, and an attention-enhanced CNN-Transformer architecture. The augmentation module applies physically valid perturbations, including distance-related amplitude scaling, temporal shifting, stochastic measurement noise, and a low-pass NLoS proxy, to reduce dependence on room-specific CSI intensity and high-frequency artifacts. The Convo-lutional Block Attention Module (CBAM) suppresses irrelevant subcarriers and localizes discriminative time-frequency regions before Transformer-based temporal modeling. Evaluations on four indoor environments show that the proposed pipeline improves over CNN- and WiFi-fall-detection baselines, reaching 96.5% accuracy on a measured NLoS room and 86.7%/89.8% accuracy on completely unseen Living Room A and Lecture Room D without target-domain fine-tuning.

Paper Title: Joint Radio-Environment Map Construction for THz ISAC via Conditional Flow Matching

Author(s): Ruixuan Li, Shuai Wang, Lingxiang Li, Zhi Chen

Presenter: Ruixuan Li, University of Electronic Science and Technology of China, China

Abstract: Terahertz (THz) integrated sensing and communication (ISAC) requires accurate radio-environment awareness under severe blockage and sparse measurements. This paper studies joint reconstruction of received signal strength (RSS) maps and obstacle occupancy grids from sparse RSS samples. We formulate the task as conditional generation of a two-channel radio-environment map and propose a conditional flow matching framework that transports Gaussian noise to the conditional map distribution guided by sparse RSS and sensing masks. The proposed method reconstructs communication-side RSS fields and sensing-side blockage semantics with one-step or few-step ODE sampling. Experiments on a ray-tracing THz dataset show that it outperforms DDPM, DDNM, and RadioUNet under different sensing ratios, achieving up to 58% lower RSS MSE and over 30% lower occupancy-grid MSE. The results demonstrate an efficient reconstruction module for closed-loop THz ISAC.

**17:35-17:50
ET2142**

TECHNICAL SESSIONS >>>

TS28: Signal Processing for Communications (III)

Session Chair: Shuaifei Chen, Purple Mountain Laboratories & Southeast University, China

Time 16:00-17:30 | Oct. 18, 2026

Venue Meeting Room 5

TALK DETAILS

Time	Presentation
16:00-16:15 ET1071	Paper Title: Joint Beamforming Design and Resource Allocation in Two-Way Cascaded RISs Batteryless IoT Networks Author(s): Shaochuan Yang, Junlei Zhi, Chongyang Tan, Yi Wang, Zheng Chu, Yuhang Liu Presenter: Shaochuan Yang, Zhengzhou University of Aeronautics, China Abstract: A novel batteryless Internet of Things (IoT) system assisted by two-way cascaded reconfigurable intelligent surfaces (RISs) is developed in this paper, which exploits cascaded reflection channels to improve the overall system performance. To exploit the cascaded reflection channels for higher capacity and wider coverage, we formulate a sum-throughput maximization problem by jointly optimizing the time allocation (TA) for EHIT and the phase shift matrices of the RISs in cooperation. Because of the non-convex structure and the tight coupling among the variables, the original problem is nontrivial. The Lagrangian dual function and Karush-Kuhn-Tucker (KKT) conditions are presented to derive the closed-form expression of the TA with the given RIS phase shifts. Then, a Riemannian Manifold Optimization (RMO) algorithm is developed, where the phase matrices of the cascaded RISs are jointly and iteratively optimized through an efficient Alternating Optimization (AO) scheme. The simulation results confirm that the two-way communication scheme further improves the system performance by introducing more available channels.
	Paper Title: OCDM-Based Driving Signal Optimization for SBS Suppression in High-Power Fiber Lasers Author(s): Shiyu Hui, Mingqian Liu Presenter: Shiyu Hui, Xidian University, China Abstract: An optimized driving signal design based on Orthogonal Chirp Division Multiplexing (OCDM) is presented to effectively suppress Stimulated Brillouin Scattering (SBS) in highpower narrow-linewidth fiber lasers. The modulation waveform is synthesized using an inversion probability-tuning sequence(IPTS), providing controllable temporal randomness derived from pseudo-random binary sequences. By employing OCDM, chirped orthogonal subcarriers reconstruct the waveform's timefrequency structure, actively broadening the optical spectrum. To achieve superior in-band spectral flatness, a time-domain binarization operation is combined with a frequency-domain weighted optimization model that minimizes

16:15-16:30
ET1058



power spectral deviation while satisfying peak-to-average power ratio (PAPR) constraints. SBS suppression performance is quantitatively evaluated using a three-wave coupled dynamic model incorporating pump, Stokes, and acoustic fields. Numerical results demonstrate significant enhancement of spectral uniformity and an elevated SBS threshold across a versatile parameter space, offering a robust and practical solution for power scaling in fiber laser systems.

**16:30-16:45
ET1102**

Paper Title: Electromagnetic Spectrum Anomaly Early Warning Using Multi-Head Attention-Enhanced Multi-Dilated Convolutional Gated Networks

Author(s): Yingchang Ma, Mingqian Liu, Zhihua Xu, Junhao Guo

Presenter: Mingqian Liu, Xidian University, China

Abstract: This paper presents an unsupervised early warning method for electromagnetic spectrum anomalies, addressing challenges such as difficult feature selection and scarce abnormal samples. The proposed approach first analyzes periodic patterns in channel temporal occupancy. We then develop an improved temporal convolutional network—termed fused multidilated factor temporal convolutional network—to extract multiscale temporal features, combined with a gated recurrent unit and a multi-head attention mechanism to enhance sequence variation modeling. By learning from historical normal data, the model predicts future channel occupancy and adaptively sets early warning thresholds using the Peaks Over Threshold model. Anomalies are detected by comparing prediction deviations against the threshold. Simulation results show that the method effectively warns of various anomalies without requiring complex feature extraction, outperforming existing approaches.

**16:45-17:00
ET3305**

Paper Title: An Adaptive Training Sequence Based Nonlinear Distortion Compensation Algorithm for SC-FDE Systems

Author(s): Haoyue Wang, Jinbo Zhang, Yashan Pang, Hang Zhang

Presenter: Haoyue Wang, The 54th Research Institute of CETC, China

Abstract: To address the nonlinear amplitude and phase distortion introduced by the power amplifier (PA) in Single-Carrier Frequency-Domain Equalization (SC-FDE) systems, this paper proposes a low-complexity receiver-side compensation algorithm that reuses the Unique Word (UW) within the frame structure. Following frequency domain equalization and phase tracking, the algorithm utilizes the known UW as training symbols and employs a complex-coefficient polynomial to perform nonlinear compensation and correction on every signal data block. To overcome the overfitting problem of least squares estimation with short training sequences, a regularization term and a prior bias constraint are introduced. Furthermore, the regularization parameter is adaptively adjusted based on the estimated noise power. Additionally, an adaptive fitting coefficient based on the Sigmoid function is designed to dynamically balance compensation strength and noise suppression. Simulations demonstrate that the proposed algorithm can be



integrated into the existing SC-FDE reception process, significantly reducing the demodulation bit error rate under nonlinear distortion for both 16QAM and 64QAM modulations, while substantially reducing computational complexity.

Paper Title: Joint Design of Frequency-Domain Spectral Shaping and Physics-Guided Soft Demapper for PA-Impaired DFT-S-OFDM Waveforms

Author(s): Liuru Xiang, Yong Li

Presenter: Liuru Xiang, Beijing University of Posts and Telecommunications, China

**17:00-17:15
ET3386**

Abstract: Discrete Fourier transform-spread orthogonal frequency-division multiplexing (DFT-s-OFDM) is attractive for uplink transmission because of its low-envelope fluctuation and efficient frequency-domain equalization. However, under nonlinear power-amplifier (PA) operation and multipath fading, residual peaks, spectral regrowth, and unreliable soft information still degrade link performance. This paper proposes an end-to-end framework that combines state-aware adaptive frequency-domain spectral shaping (FDSS) with a physics-guided residual soft demapper, termed PR-Demap. At the transmitter, a low-order Chebyshev frequency response is generated according to the link state, whereas PR-Demap refines model-based soft information using distortion-aware learned corrections. In representative PA-impaired multipath evaluations with an input back-off (IBO) of 6 dB, the proposed adaptive frequency-domain spectral shaping achieves a 1.78 dB peak-to-average power ratio (PAPR) reduction over the baseline while maintaining favorable adjacent-channel spectral compatibility during peak suppression; the receiver-side PR-Demap also requires a lower signal-to-noise ratio (SNR) than existing deep receivers at a bit error rate (BER) of 1%. Overall, the framework provides an effective tradeoff among reliability, peak suppression, spectral leakage, and model complexity under nonlinear power amplification and multipath fading.

Paper Title: A Design of Alamouti Coding with Asymmetric Transmit Symbols for Non-Orthogonal Transmission

Author(s): Dehuan Wan, Ronglan Huang, Jiacheng Sun, Jingxian Liu

Presenter: Dehuan Wan, Guangdong University of Finance, China; Ronglan Huang, South China University of Technology, China

**17:15-17:30
ET4467**

Abstract: Alamouti space-time block coding (STBC) is a pivotal technique for mitigating intra-group multi-user interference in non-orthogonal multiple access (NOMA) systems. However, conventional Alamouti-aided NOMA frameworks predominantly employ a balanced transmission mode, where an equal number of required symbols are allocated to both cell-center and cell-edge users. Such a paradigm is inherently suboptimal as it overlooks the significant channel heterogeneities between users—it not only fails to capitalize on the superior channel conditions of the cell-center user, but also inadvertently dilutes the interference suppression capabilities of STBC. To overcome these limitations, this



paper proposes an asymmetric transmission mode for Alamouti-aided NOMA, tailored to the distinct channel characteristics of the users. Specifically, in the construction of the Alamouti transmit codebook, the number of symbols required for the cell-edge user is strategically reduced by one compared to that of the cell-center user. This symbol reduction strategy offers dual benefits: first, it substantially alleviates intra-group multi-user interference, which is particularly advantageous for cell-edge users operating under poor channel conditions; second, the diminished symbol count allows for an increased power quota per transmitted symbol, thereby significantly enhancing the signal-to-interference-plus-noise ratio (SINR) at the receiver. Furthermore, we derive closed-form expressions for both the achievable sum-rate and the outage probability of the proposed scheme. Numerical results validate the superior efficiency and robustness of the proposed asymmetric transmission paradigm.

TECHNICAL SESSIONS >>>

TS29: Optical Communications and Networks & RF/Microwave Circuits (III)

Session Chair: Feiyu Li, Information Support Force Engineering University, China

Time 16:00-17:50 | Oct. 18, 2026

Venue Meeting Room 6

INVITED TALK | 16:00-16:20

Dual-Band FSO-UVC Bit-Splitting for Low-Probability-of-Interception Communications

Huatao Zhu, Information Support Force Engineering University, China

Abstract: Free-space optical (FSO) communication offers high directivity and immunity to electromagnetic interference, yet single-wavelength FSO links remain vulnerable to full-signal recovery upon beam interception. This paper proposes a dual-band FSO-UVC transmission architecture that integrates 1550nm FSO with 254nm solar-blind ultraviolet communication (UVC), employing a three-layer security mechanism built upon a bit-splitting framework. The physical layer, which distributes split-bit sub-streams across heterogeneous wavelength channels to create inherent information deficiency against single-path interception, constitutes the core quantitative focus of this work. The information layer (pre-shared scrambling rule) and dynamic layer (pseudo-random time-varying allocation) provide additional qualitative security barriers against dual-path joint interception and long-term observation, respectively. A dual-band eavesdropping threat model is established, incorporating Gamma-Gamma turbulence for the FSO path and a 4H-SiC avalanche photodiode (APD) noise model for the UVC path. Analytical expressions for the effective information leakage rate and secrecy throughput are derived. Simulation results demonstrate that under a fixed equal-splitting configuration at 10dBm total transmit power, the UVC single-path effective leakage rate is 8.73%, below the 10% security threshold. With adaptive two-dimensional joint optimization of bit-splitting ratio and power allocation, the secrecy throughput reaches 19.79Mbps under engineering reliability constraints, while the conventional single-FSO baseline and fixed equal-splitting scheme both yield near-zero secrecy throughput, confirming the necessity and effectiveness of the adaptive joint optimization framework.



INVITED TALK | 16:20-16:40



Intelligent Operation and Maintenance for Optical Network

Qimei Chen, Wuhan University, China



Abstract: Intelligent operation and maintenance (O&M) is critical for ensuring service continuity in optical networks, but practical fault diagnosis and state awareness are still hindered by scarce fault samples and heterogeneous multi-source observations. This work presents a research roadmap of data augmentation, state fusion, and platform application. For few-shot fault identification, a physics-informed diffusion-based augmentation method, PI-Diffusion, is proposed by embedding operating-range, optical-correlation, and temporal-difference constraints into generative training. For multi-source state perception, time alignment, object association, and semantic unification are investigated to construct a shared state representation for fusion and trend prediction. A layered O&M platform is further designed to integrate data access, status visualization, evidence tracing, diagnosis assistance, model serving, and human-in-the-loop handling. These findings indicate that physics-informed data augmentation can enhance few-shot fault identification, while multi-source fusion and platform design can advance intelligent optical network O&M toward continuous evolution, trustworthy human-machine collaboration, and end-to-end service assurance.

INVITED TALK | 16:40-17:00

SDN-controlled multi-user NOMA-OFDM visible light communication systems

Jian Zhao, South China University of Technology, China



Abstract: We review our recent advances on multi-user NOMA-OFDM visible light communications (VLC) systems, where resource allocation is executed in a software-defined network (SDN) platform and the allocation results are used to dynamically configure FPGA-based real-time transceivers. First, an SDN-controlled real-time VLC system with dynamic adaptation to user demand and channel condition with the latency < 450 ms is developed. Second, various adaptive bit and power loading algorithms are proposed for resource allocation in the single-cell scenario, coordinated multiple-point transmission for the multi-cell scenario, and complexity reduction using subcarrier grouping. Experiments using the developed SDN-controlled NOMA-OFDM VLC system are conducted to verify the advantages of the proposed algorithms.

INVITED TALK | 17:00-17:20



Resilient Optical Networking in Artificial Intelligence Data Center Optical Networks

Xin Li, Beijing University of Posts and Telecommunications, China



Abstract: With the rapid growth of AI large models and edge intelligence, single-node computing power falls short of the demands of distributed training and real-time inference. Optical networks offer ultra-high bandwidth, low latency, hard isolation, and low power consumption, making them ideal for interconnecting distributed computing resources. However, traditional optical networks act only as transparent pipes, lacking awareness of computing resources and the ability to coordinate with computing tasks. The AIDC optical network aims to address this by introducing computing awareness, joint scheduling, deterministic bearer, and AI empowerment into optical networks. This report focuses on the architecture and key technologies of achieving resilient AIDC optical networks.

TALK DETAILS

Time	Presentation
17:20-17:35 ET4468	Paper Title: Enhanced White Rabbit Time Synchronization over Fiber Based on Time-Frequency Fusion Transfer Author(s): Wantao Huang, Minghong Li, Dong Hou Presenter: Wantao Huang, Kaili University, China Abstract: White Rabbit (WR) is a high-precision optical fiber time-frequency synchronization technology that has been deployed in multiple large-scale scientific facilities. However, the slave site's frequency reference in a conventional WR system relies on clock data recovery (CDR) from the data stream, which lacks adequate suppression of random phase noise introduced by the fiber link, thereby limiting further improvement of short-term stability. This paper proposes an enhanced WR time synchronization method based on time-frequency fusion transfer. Without altering the WR protocol framework, an independent high-stability optical fiber frequency transfer link is introduced to provide a high-quality frequency reference for the slave site, combined with high-resolution phase detection and fine phase-shift compensation for jitter optimization. Experimental results over a 10 km fiber link show that the optimized system achieves a time stability (TDEV) @1 s is reduced from 30.9 ps to 10.9 ps, demonstrating the effectiveness of the proposed method in improving WR time-frequency synchronization stability.
17:35-17:50 ET4524	Paper Title: Frequency-Hopping Optical Covert Communication System Based on Gain-Switched Laser Author(s): Yongliang Yin, Huatao Zhu, Shuwen Chen, Yang Li, Feng Jiang, Yibo Liu and Tong Xu Presenter: Huatao Zhu, Information Support Force Engineering University, China



Abstract: To address the poor transmission adaptability and insufficient concealment when frequency-hopping microwave signals are integrated with fiber-optic links. This paper proposes a frequency-hopping optical covert communication method based on a gain-switched laser. A flat-top broadband optical frequency comb is generated by directly modulating the gain-switched laser. The frequency-hopping microwave signal is modulated onto the optical frequency comb, followed by time-domain and frequency-domain processing. The signal is buried under the noise floor of the public optical channel to realize covert signal transmission. System simulations are performed to analyze the performance from multiple dimensions including spectral concealment, recovered waveform quality, and bit error performance. Simulation results show that the covert frequency-hopping microwave signal with a dwell time of 5ns can be dehopped at the receiver after covert transmission over a 50 km optical fiber. The covert signal buried in public- channel noise is hardly distinguishable via spectrum analysis. This scheme achieves LPI performance with a compact structure.



POSTER SESSIONS >>>

PS01: Signal Processing, Information Theory and Integrated Sensing

Session Chair: Yongmin Li, Shanxi University, China

Time 13:30-15:30 | Oct. 17, 2026

Venue Poster Area-Meeting Room 8

No.	Paper ID	Presentation
01	ET1012	Paper Title: Faster-than-Nyquist Signaling Using Genetic Algorithm-Based Polar Codes Author(s): Bo Chen, Benjamin K. Ng, Ieok Cheng Wong, Chan-Tong Lam Presenter: Bo Chen, Macao Polytechnic University, China
02	ET1093	Paper Title: Construction of Optimal No-Hit-Zone Frequency Hopping Sequence Sets Using AES-Ciphertext-Assisted Permutation Author(s): Yipeng Hu, Dongpo Song, Hao Wang, Shilian Wang Presenter: Shilian Wang, National University of Defense Technology, China
03	ET2212	Paper Title: Performance Evaluation of a Certain Transceiver Architecture for Multiple-Input Multiple-Output Phase-Modulated Channels Author(s): Hengyu Cui, Ru-Han Chen, Zhenyao He, Shijun Zhu, Ruoqi Sun, Yeqin Tai Presenter: Hengyu Cui, Nanjing University of Science and Technology, China
04	ET2236	Paper Title: Hybrid OMA-NOMA Scheduling for Semantic Remote Estimation under Reliability Constraints Author(s): Bo Jia, Shiyong Zhou, Haoyuan Pan Presenter: Bo Jia, Shenzhen University, China
05	ET4461	Paper Title: Sparsification via Syndrome-Consistent Artificial Pencils Search and Assembly for Short Codes Author(s): Haixin Zhang, Ming Jiang Presenter: Haixin Zhang, Southeast University, China
06	ET1022	Paper Title: Low-Complexity Orthogonal Matching Pursuit-Based Channel Estimation for mmWave LEO Communications Author(s): Chengyao Ruan, Jingping Liang, Shuangju Zhou, Yingying Wu, Zhe Chen, Ning Zhang Presenter: Chengyao Ruan, Shanghai Xiaoyuan Innovation Center, China
07	ET1040	Paper Title: Global Attention-Based Hybrid Convolution and Transformer Networks for OFDM Systems Author(s): Qingyang Lu, Xing Zheng, Changhan Shi, Jiawei Sun Presenter: Qingyang Lu, Hangzhou Dianzi University, China
08	ET1050	Paper Title: Toeplitz-Based Lightweight Neural Network Behavioral Model for DPD of RF PAs



- | | | |
|----|--------|--|
| | | <p>Author(s): Yutong Nie, Qianqian Zhang, Wenxia Zhou, Jiaqian Wang, Falin Liu</p> <p>Presenter: Yutong Nie, University of Science and Technology of China, China</p> |
| 09 | ET1069 | <p>Paper Title: Scale-Adaptive Low-Complexity 3-D Mixed Source Localization for Uniform Planar Arrays</p> <p>Author(s): Yang Gu, Xiaohuan Wu</p> <p>Presenter: Yang Gu, Nanjing University of Posts and Telecommunications, China</p> |
| 10 | ET1073 | <p>Paper Title: Channel Estimation for Hybrid RIS with Centrally Symmetric Receiving Structure</p> <p>Author(s): Jiahua Yang, Mingzhi Li, Lve Han, Xiaohuan Wu</p> <p>Presenter: Jiahua Yang, Nanjing University of Posts and Telecommunications, China</p> |
| 11 | ET1074 | <p>Paper Title: Adaptive Data Segmentation Root-SBL for Off-Grid DOA Estimation in 6G LEO-D2S Communications</p> <p>Author(s): Zhiwei He, Cong Lin, Wenliang Lin, Yaohua Deng, Wen Liu, Zhongliang Deng</p> <p>Presenter: Zhiwei He, Beijing University of Posts and Telecommunications, China</p> |
| 12 | ET1082 | <p>Paper Title: Design of a Parallel FEC Encoder and Decoder Based on the JESD204C Protocol</p> <p>Author(s): Zhaoyang Ma, Xiaolong Ma</p> <p>Presenter: Zhaoyang Ma, Northwest University, China</p> |
| 13 | ET1083 | <p>Paper Title: MIMO-OFDM Channel Estimation Based on IGWO-SH-Optimized U-Net</p> <p>Author(s): Chenyang Yuan, Yuyang Sun</p> <p>Presenter: Chenyang Yuan, China United Network Communications, China</p> |
| 14 | ET1087 | <p>Paper Title: Federated Radio Frequency Fingerprint Identification Based on Adaptive Data Augmentation and Multi-Expert Soft Voting</p> <p>Author(s): Jiahao Tang, Yutao Jiao, Guoru Ding, Peng Tang, Guofeng Wei</p> <p>Presenter: Jiahao Tang, Army Engineering University of PLA, China</p> |
| 15 | ET1104 | <p>Paper Title: An Agile Outphasing All Digital Transmitter Based on Iterative Optimization</p> <p>Author(s): Zhihu Wei, Lei Zhu, Zhang Chen, Qiang Zhou, Jun Yang, Haoyang Fu</p> <p>Presenter: Zhihu Wei, National University of Defense Technology, China</p> |
| 16 | ET2138 | <p>Paper Title: DOA Estimation for Imperfect Motion-Synthesized Sparse Arrays</p> <p>Author(s): Long Zhang, Weijia Cui, Sheng Wang, Song Chen, Wei Lin</p> |



		Presenter: Long Zhang, Information Engineering University, China
17	ET2156	Paper Title: Blind Symbol Detection for Symbolic Dynamics-Based Chaotic Modulation via Switching Kalman Filtering Author(s): Ang Zhou, Shilian Wang Presenter: Ang Zhou, National University of Defense Technology, China
18	ET2181	Paper Title: Wideband Blocker Cancellation Method for Direct RF Sampling Receivers Based on Nonlinear Characteristic Modeling Author(s): RuiTao Su, FangMin He, JinLing Xing, QingXia Li, Yu Guo Presenter: RuiTao Su, Huazhong University of Science and Technology, China
19	ET2183	Paper Title: Blind Delay Estimation Algorithm for an Asynchronous SCMA System Author(s): Li Yuan, Pengtao Liu, Jing Lei Presenter: Li Yuan, National University of Defense Technology, China
20	ET3259	Paper Title: Fractional-Order Transform Domain Adaptive Filtering Algorithms Author(s): Mingze Ma, Xirui Lin, Bin Lin Presenter: Mingze Ma, Dalian Maritime University, China
21	ET3283	Paper Title: Two-Layer Relay Reciprocity Calibration for Multi-Antenna Cell-Free Massive MIMO Systems Author(s): Junze Zheng, Yuanmeng Song, Pengcheng Zhu Presenter: Junze Zheng, Southeast University, China
22	ET3304	Paper Title: Hardware Impairment Modeling for Embedded-Pilot OTFS-Based LEO Satellite Downlinks Author(s): Zhuo Zhang, Yongshuang Zhang, Feng Wang, Youyang Xiang, Xiantao Cheng, Lidong Zhu Presenter: Zhuo Zhang, University of Electronic Science and Technology of China, China
23	ET3309	Paper Title: Absolute Calibration for HF Skywave Massive MIMO Systems Using Multiple Calibration Sources Author(s): Fuqian Yang, Yutao Wang, Chun Cai, Penghao Cai, Li You, Xiqi Gao Presenter: Fuqian Yang, Purple Mountain Laboratories, China
24	ET3317	Paper Title: Knot-Inspired Structural Encoding for Robust Information Representation under Geometric Perturbations Author(s): Xinlin Dai, Rongen Dong, Yu Chen, Zihao Fan, Renhui Liang, Aitong Gong Presenter: Xinlin Dai, Hainan University, China
25	ET3373	Paper Title: Multi-Mode OCDM Index Modulation with Full Subcarrier Activation Patterns



Author(s): Boyi Zou, Jinbang Kong, Zhijun Liu, Wei Deng, Yili Xia, Wenjiang Pei

Presenter: Boyi Zou, Southeast University, China

26 ET3381

Paper Title: BEM-Constrained Subspace Blind Channel Estimation for Time-Varying MIMO-OFDM Systems

Author(s): Tanrui Liu, Hui Li

Presenter: Tanrui Liu, University of Science and Technology of China, China

27 ET3398

Paper Title: A CSI Based Cross-Domain Indoor Localization Algorithm with DANN Position Feature Learning and GAF Image Encoding

Author(s): Shaolong Zuo, Yuxuan Su, Jun Yan

Presenter: Shaolong Zuo, Nanjing University of Posts and Telecommunications, China

28 ET3426

Paper Title: Segmented Orthogonal Pilot Design for High-Mobility STBC-Encoded 16-APSK Systems

Author(s): Tengwei Ren, Penghui Lai, Shilian Wang

Presenter: Penghui Lai, National University of Defense Technology, China

29 ET4497

Paper Title: Blind OFDM Signal Parameter Estimation Based on Automatic Multiscale Peak Detection

Author(s): Xiangxin Qi, Wenxiu Zheng

Presenter: Xiangxin Qi, Xi'an University of Posts and Telecommunications, China

30 ET4510

Paper Title: Clock-Bias Model Selection for OTFS-Based Positioning

Author(s): Siqi Xia, Aijun Liu, Xiaohu Liang, Xin Lin

Presenter: Siqi Xia, Army Engineering University of PLA, China

31 ET1015

Paper Title: Power-Efficient Joint Uplink-Downlink Optimization for Multi-UAV-Assisted ISAC System

Author(s): Jinwei Wang, Laixian Peng, Renhui Xu, Xianglin Wei, Jianyu Wei, Hai Wang

Presenter: Jinwei Wang, Army Engineering University of PLA, China

32 ET1056

Paper Title: Adaptive Clutter-Aware PMBM Filtering for ISAC Multi-Target Tracking via Multi-Station Likelihood Fusion

Author(s): Xinyu Ma, Lan Tang

Presenter: Xinyu Ma, Nanjing University, China

33 ET1065

Paper Title: Active Decoy-Assisted Joint Anti-Jamming Resource Optimization for Multi-Base-Station OFDM Cooperative Sensing

Author(s): Hui Luo, Lan Tang

Presenter: Hui Luo, Nanjing University, China

34 ET2131

Paper Title: Conditional Diffusion-Based Point Cloud Imaging for UAV Position and Attitude Sensing

Author(s): Xinhong Dai, Yuan Gao, Hao Jiang, Xiaojun Yuan, Xin Wang



		Presenter: Xinhong Dai, Fudan University, China
35	ET2146	Paper Title: Cross-Domain Covariance-Aware RPCA for Clutter Suppression in OFDM-ISAC Systems Author(s): Ke Lin, Jiahao Bai, Jihao Luo, Jingxuan Huang, Shanshan Wu, Zesong Fei Presenter: Ke Lin, Beijing Institute of Technology, China
36	ET2175	Paper Title: NOMA-Assisted Mixed Near- and Far-Field ISAC Beamforming Design Author(s): Zhengyu Zhao, Yuexia Zhang, Tianqi Cui Presenter: Zhengyu Zhao, Beijing Information Science and Technology University, China
37	ET2178	Paper Title: Two-Stage Secure ISAC in IRS-Assisted UAV Systems with Active Eavesdropper Localization Author(s): Shuhan Zhang, Xueyan Cao, Shubin Wang Presenter: Shuhan Zhang, Inner Mongolia University, China
38	ET2195	Paper Title: Multipath Matching Based Urban Vehicle Sensing with Known Building Blockage and T-Junction Geometry Author(s): Zeng Jiawei, Zhang Zhaoyang, Yang Zhaohui Presenter: Zeng Jiawei, Zhejiang University, China
39	ET2213	Paper Title: High-Resolution ISAR Imaging Based on OFDM Signals Author(s): Wenxuan Qin, Xingchen Fang, Lan Tang Presenter: Wenxuan Qin, Nanjing University, China
40	ET2247	Paper Title: Exploiting GOCDM Waveforms for Sensing Author(s): Shiyuan Li, Deyu Lu, Yiyin Wang Presenter: Shiyuan Li, Shanghai Jiao Tong University, China
41	ET3273	Paper Title: Proportional Fairness Beamforming Design for UAV-Enabled Integrated Sensing and Communication Author(s): Jinrui Pang, Peng Li, Xibei Jia Presenter: Jinrui Pang, Chongqing University of Arts and Sciences, China
42	ET3312	Paper Title: A Bistatic Radio SLAM Method Based on RSRP Image and Relative Delay Geometric Constraints Author(s): Jun Wang, Jie Yang, Lei Xue, Xiao Li, Shi Jin Presenter: Jun Wang, Southeast University, China
43	ET3339	Paper Title: High-Precision Radar Measurement on Moving Platforms for Vital Sign Sensing Author(s): Jiaxiong Guo, Jun Bao, Rui Duan Presenter: Jiaxiong Guo, University of Electronic Science and Technology of China, China
44	ET3351	Paper Title: Improved SIC-ESPRIT for Parameter Estimation Beyond CP in Spaceborne Bistatic OFDM ISAC



45

ET4484

Author(s): Tongtong Fu, Bin Zhou, Wei Zhang

Presenter: Tongtong Fu, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China

Paper Title: Complementary Codes Sets Combined with Staggered PRI for Flexible Waveform Design in Coherent Pulse Radar

Author(s): Zhenyu Zhang, Guixin Xuan, Xuejiao Gong, Bibo Liu, Chengkun Cao, Ang Jiang

Presenter: Zhenyu Zhang, Information Support Force Engineering University, China

POSTER SESSIONS >>>

PS02: AI for Communications, Space-Air-Ground and IoT Networks

Session Chair: Xiaofan Li, Jinan University, China

Time 16:00-18:00 | Oct. 17, 2026

Venue Poster Area-Meeting Room 8

No.	Paper ID	Presentation
01	ET3392	Paper Title: Time-Division Joint Bi-Static Sensing and Uplink Multi-UAV Communications Author(s): Tongshu Zhang Presenter: Tongshu Zhang, Naval Aviation University, China
02	ET4465	Paper Title: Doppler Compensation and Clutter Suppression for Detection-Rate Tradeoff in LEO Satellite ISAC Author(s): Zhou Xiangrong, Chai Zihang, Li Jiachi, Hu Lingyun, Zhang Kaixiang Presenter: Zhou Xiangrong, Beijing Institute of Technology, China
03	ET2144	Paper Title: A Semantic Speech Communication System with Joint Acoustic Modeling and Prototype Validation Author(s): Dongxu Yang, Peiwen Jiang, Xiao Li, Le Liang, Jun Zhang, Shi Jin Presenter: Dongxu Yang, Southeast University, China
04	ET3382	Paper Title: Multi-I2Ts Driven Semantic Communication System for Image Transmission Author(s): Yuhang Deng, Lei Teng, Sen Wang, Chen Dong, Xiaodong Xu Presenter: Yuhang Deng, Beijing University of Posts and Telecommunications, China
05	ET4507	Paper Title: Power-Mismatched Reliability Gating in DeepJSCC: A Zero-Trainable-Parameter Correction and a Missing Control for Contextual Receivers Author(s): Haojun Dou, Ying Huang, Xiangyu Hu, Zhonghao Chen Presenter: Haojun Dou, National University of Defense Technology, China
06	ET1031	Paper Title: Robust Multi-Agent Reinforcement Learning for UAV-Aided Wireless Networks under Degraded Channel Observations Author(s): Tianyu She, Boyao Shi, Shaosheng Li Presenter: Tianyu She, Beijing University of Posts and Telecommunications, China
07	ET1054	Paper Title: KDD-Net: A Knowledge and Data Dynamic Fusion Network for Few-Shot Modulation Recognition Author(s): Runhao Ji, Xiaogang Tang, Minghui Gao, Lu Wang, Binqun Zhang, Hongji Xing Presenter: Runhao Ji, Space Engineering University, China



08	ET1061	Paper Title: Physics-Guided Schrödinger Bridge Diffusion for Radio Map Construction under Extreme Sparsity Author(s): Yang Wu, Hongjun Wang, Zhexian Shen, Yanrong Ye, Tao Wu Presenter: Yang Wu, National University of Defense Technology, China
09	ET2121	Paper Title: End-to-End Learning with Channel-Aware Transceiver Design for MU-MIMO-OFDM Systems Author(s): Zhendong Zhao, Zhong Zheng, Yuan Li, Zesong Fei Presenter: Zhendong Zhao, Beijing Institute of Technology, China
10	ET2148	Paper Title: Chansformer: A Lightweight Network for Robust OFDM Channel Estimation Author(s): Shirong Tu, Zimeng He, Qi Yang Presenter: Shirong Tu, Xiamen University, China
11	ET2163	Paper Title: Intelligent Communication Waveform Decision Method Based on Dual-Tower Matching and Attention Mechanism Author(s): Shengzhou Ding, Ang Zhou, Shilian Wang Presenter: Shengzhou Ding, National University of Defense Technology, China
12	ET2208	Paper Title: XCRM: A Swin Transformer V2-Based Model for XL-MIMO Channel Reconstruction with Sparse and Flexible Inputs Author(s): Tongze Li, Xiangrui Lai, Ran Zhang, Siyu Guo, Zhongyuan Zhao Presenter: Ran Zhang, Beijing University of Posts and Telecommunications, China
13	ET2211	Paper Title: Deep Learning-Based Beam Training for XL-MIMO Near-Field Communications: When the Probing Pattern Is Flexible and Configurable Author(s): Ran Zhang, Siyu Guo, Tongze Li, Xiangrui Lai, Zhongyuan Zhao Presenter: Ran Zhang, Beijing University of Posts and Telecommunications, China
14	ET2237	Paper Title: FD-MLP: A Lightweight Filtering-Difference Model for Multi-Step LEO SNR Forecasting Author(s): Zhang Zhenglong, Xie Haihua, Ai Haohua, Sun Siyue, Liang Guang, Li Huawang, Hu Haiying Presenter: Zhang Zhenglong, Innovation Academy for Microsatellites, Chinese Academy of Sciences, China
15	ET3262	Paper Title: DRL-Enabled Joint Trajectory and Bandwidth Optimization for Task-Reuse UAV Relaying in Urban Cellular Networks Author(s): Yicheng Wang, Xiaoyang Wang, Xin Li, Luting Kong, Shan Guo, Ya Liu, Shiyu Cui, Weiyan Chen, Yuehong Gao Presenter: Yicheng Wang, Beijing University of Posts and Telecommunications, China
16	ET3266	Paper Title: GCT-STNet: Geometry-Conditioned Spatiotemporal Network for Multi-Task Channel Statistics Prediction in SAGINs



		Author(s): Wenda Zhang, Jian Yang, Jiadong Shang, Hui Gao, Jinyi Zhao Presenter: Wenda Zhang, Beijing Institute of Remote Sensing Equipment, China
17	ET3282	Paper Title: Dynamic Error Modeling and Analysis of Delay Mismatch in Multi-Level Outphasing All-Digital Transmitters Author(s): Mingqi Wang, Lei Zhu, Zhihu Wei, Xuran Song, Xingyu Zhou, Zhang Chen Presenter: Mingqi Wang, National University of Defense Technology, China
18	ET3311	Paper Title: VeriKG: Intelligent Verification of Network Configuration with Knowledge Graph-Enhanced LLMs Author(s): Haoyu He, Yuxuan Pei, Xiaoning Zhang, Jiayi Jiang, Jin Yang, Xiao Yang Presenter: Haoyu He, University of Electronic Science and Technology of China, China
19	ET3377	Paper Title: Dense-Sparse Pilot Design and Fast Generalization for OFDM Channel Estimation Author(s): Zhiming Liu, Shuangfeng Han, Jiangzhou Wang Presenter: Zhiming Liu, China Mobile Research Institute, China
20	ET3404	Paper Title: One-Step SNR-Conditioned Video-Swin Transformer for Compressed Feedback of Time-Varying CSI Author(s): Ziqi Peng, Liyang Lu, Yichen Liu, Fengyu Wang, Wenjun Xu Presenter: Ziqi Peng, Beijing University of Posts and Telecommunications, China
21	ET4459	Paper Title: A CSI and Federated Learning-Based Indoor Localization Algorithm under Model and Data Heterogeneity Author(s): Ziheng Yang, Jiaqi Zhou, Jun Yan Presenter: Ziheng Yang, Nanjing University of Posts and Telecommunications, China
22	ET4472	Paper Title: A Spectrum-Sharing-Based Optimization Algorithm for D2D Computation Offloading in MEC Systems Author(s): LinYang Yu, Qi Zhu Presenter: LinYang Yu, Nanjing University of Posts and Telecommunications, China
23	ET2242	Paper Title: Loop-Free Local Route Repair in FANETs Using Spanning Tree Pivot Gray Codes Author(s): Hua Yang, Dennis Wong, Xing Wei Presenter: Hua Yang, Macao Polytechnic University, China
24	ET4475	Paper Title: Joint Beamforming and Fronthaul Compression for Cell-Free ISAC Systems Author(s): Junying Zhou, Yijie Chen, Yao Zhang, Wenchao Xia Presenter: Junying Zhou, Nanjing University of Posts and



		Telecommunications, China
25	ET1013	Paper Title: UWB Positioning Method Based on Grey Correlation in NLOS Environment Author(s): Weishu Sui Presenter: Weishu Sui, Northeastern University, China
26	ET2113	Paper Title: Variational Bayesian Unscented Kalman Filtering in Clock Parameter Estimation with Unknown Delay Distribution Author(s): Ning Meng, Kaixuan Kang, Jinghua Zhang, Weimiao Jing, Suzhi Cao, Peng Liu Presenter: Ning Meng, University of Chinese Academy of Sciences, China
27	ET2219	Paper Title: Multifunctional Radar Dynamic Jamming Decision Based on Sequential Conditional Hybrid PPO Author(s): Shangle Li, Luyan Xu, Ying Ma, Haichuan Ding, Xingyun Chen Presenter: Shangle Li, Academy of Military Sciences, China
28	ET2243	Paper Title: Multi-Static Multi-Channel Phase Measurement Based Temperature Estimation for Ambient IoT Author(s): Zhen Chen, Zebin Pan, Jinwen He Presenter: Zhen Chen, Jinan University, China
29	ET3270	Paper Title: Wavelet-Guided Masked Contrastive Pretraining for Few-Shot Specific Emitter Identification Author(s): Haoran Ding, Pengfei Liu Presenter: Haoran Ding, Nanjing University of Posts and Telecommunications, China
30	ET3324	Paper Title: Joint UAV Data Collection and IoT Node Localization via Hierarchical Policy Optimization Author(s): Yicheng Zhao, Hai Wang, Zhen Qin, Weihao Sun Presenter: Yicheng Zhao, Army Engineering University of PLA, China
31	ET2110	Paper Title: Joint User Association and Robust Beamforming for LEO Multi-Satellite Cooperative Communications Author(s): Xiao Yu, Gang Liang, Yongbo Yao, Xin Wang Presenter: Xiao Yu, Beijing Institute of Technology, China
32	ET2118	Paper Title: A Multidimensional Fusion Physical Layer Security Architecture for Air-Space-Ground-Maritime Networks Author(s): Xinjin Lu, Yuxin Shi, Ganhua Ye, Shijun Xie, Sili Liu, Zikuan Li Presenter: Xinjin Lu, National University of Defense Technology, China
33	ET2162	Paper Title: Local Altruistic Game Based Distributed Offloading for LEO Satellite Edge Computing Constellations Author(s): Xin Zhou, Xiaokai Zhang, Yanan Xiong, Xuejiao Li, Yiyuan Liu, Shilong Huang Presenter: Xin Zhou, Army Engineering University of PLA, China



34	ET2173	Paper Title: GNN-Assisted Holding and Release for Cislunar DTN Buffer Management Author(s): Jiarui Zhu, Minzhao Ke, Yuxiang Huang, Wuyang Zhou Presenter: Jiarui Zhu, University of Science and Technology of China, China
35	ET2184	Paper Title: Priority-Aware Autonomous Congestion Control for Cislunar DTNs Using Reinforcement Learning Author(s): Minzhao Ke, Jiarui Zhu, Wuyang Zhou Presenter: Minzhao Ke, University of Science and Technology of China, China
36	ET2228	Paper Title: Quantifying Beamwidth-Dependent Interference in NGSO NTN and Terrestrial IMT Systems Author(s): Fei Peng, Xinyu Zhang, Huiliang Liu Presenter: Huiliang Liu, China Academy of Space Technology, China
37	ET2235	Paper Title: Coverage and Connectivity Optimization Based on Role-Oriented Multi-Agent Reinforcement Learning for Multi-UAV Emergency Networking Author(s): Siqi Zhou, Songkai Yang, Kaiming Liu, Yuanan Liu Presenter: Siqi Zhou, Beijing University of Posts and Telecommunications, China
38	ET3295	Paper Title: Eigengap-Guided Gram-Subspace Physical-Layer Key Generation for LEO MIMO Links Author(s): Jingping Liang, Chengyao Ruan, Shuangju Zhou, Yingying Wu, Zhe Chen, Ning Zhang Presenter: Jingping Liang, Shanghai Xiaoyuan Innovation Center, China
39	ET3337	Paper Title: Joint Subcarrier and Power Allocation for Satellite Communication Based on OTFS-NOMA Author(s): Mingqi Gao, Jianmei Dai, Shibing Zhu, Wenqian Zhang, Keying Li, Xi Han Presenter: Mingqi Gao, Space Engineering University, China
40	ET3355	Paper Title: Joint Uplink Beam-Hopping and Power Allocation for Coexisting LEO Satellite Systems under Long-Term Interference Protection Constraints Author(s): Yaxin Wang, Yifei Chen, Junwei Zhou, Zhiting Huang, Ke Wang Presenter: Yaxin Wang, Beijing University of Posts and Telecommunications, China
41	ET3359	Paper Title: An Effective Routing Scheme for Minimizing Age of Information in LEO Communication Networks Author(s): Luoqing Tang, Congduan Li Presenter: Congduan Li, Sun Yat-sen University, China
42	ET3407	Paper Title: SACC-CGR: Service-Aware Capacity Commitment Contact Graph Routing for Cislunar DTNs



- | | | |
|----|--------|---|
| | | <p>Author(s): Jinghua Zhang, Xinyan Xie, Kaixuan Kang, Mingyue Bian, Suzhi Cao</p> <p>Presenter: Jinghua Zhang, University of Chinese Academy of Sciences, China</p> |
| 43 | ET3428 | <p>Paper Title: Layered Integrity Measurement Design and Verification for U-Boot in Satellite Internet Payloads</p> <p>Author(s): Dian Li, Zhoushi Yao, Guoling Zheng, Kun Zhang</p> <p>Presenter: Dian Li, Zhejiang University, China</p> |
| 44 | ET4453 | <p>Paper Title: OrbitSync: A Satellite-Ground Cooperation Framework for Large-Small Model Collaborative Inference</p> <p>Author(s): Meng Yuan, Songjing Tao, Qiang Wu, Ran Wang, Jie Hao</p> <p>Presenter: Meng Yuan, Nanjing University of Aeronautics and Astronautics, China</p> |
| 45 | ET4523 | <p>Paper Title: Text2Policy: End-to-End SQL Policy Set Generation from Business Regulations</p> <p>Author(s): Hao Li, Chen Gao, Liang Liu, Yawei Liu, Siyu Cai, Xiaohan Li, and, Mei Feng</p> <p>Presenter: Hao Li, Xinjiang Research Institute of the Huairou Laboratory, China</p> |
| 46 | ET3254 | <p>Paper Title: Diffusion-Based Decoding of PAC Codes with Lower Latency</p> <p>Author(s): Wei Guo, Wenbin Guo</p> <p>Presenter: Wei Guo, Beijing University of Posts and Telecommunications, China</p> |
| 47 | ET4513 | <p>Paper Title: Action-Aligned Topology Steering for Deadline-Reliable Vehicular Edge Offloading</p> <p>Author(s): Jiayi Liu, Bin Zhou, Zhaoqi Liu, Wei Zhang</p> <p>Presenter: Jiayi Liu, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China</p> |
| 48 | ET4500 | <p>Paper Title: Uplink-Downlink Resource Planning for DTP-Enabled GEO High-Throughput Satellites</p> <p>Author(s): Yifan Liu, Yuechu Jiang, Chen Zhang, Gengxin Zhang</p> <p>Presenter: Chen Zhang, Nanjing University of Posts and Telecommunications, China</p> |

POSTER SESSIONS >>>

PS03: Communication Security, Optical Networks and Advanced Wireless Systems

Session Chair: Xu Wang, Jinan University, China; Yijing Liu, University of Electronic Science and Technology of China, China

Time 13:30-15:30 | Oct. 18, 2026

Venue Poster Area-Meeting Room 8

No.	Paper ID	Presentation
01	ET4454	Paper Title: MARS: Model-Aware Rekey Scheduling for Periodic ML-KEM Refresh over Intermittent Satellite Links Author(s): Yingying Wu, Jingping Liang, Shuangju Zhou, Zhe Chen, Chengyao Ruan, Ning Zhang Presenter: Yingying Wu, Shanghai Xiaoyuan Innovation Center, China
02	ET4478	Paper Title: From Sensing to Action: Finite-Horizon SC3 Loop Optimization for the Internet of Embodied AI Agents Author(s): Yueshan Lin, Wei Feng, Yunfei Chen, Chongwen Huang, Ning Ge Presenter: Yueshan Lin, Tsinghua University, China
03	ET4479	Paper Title: Graph-Partitioned Link Admission for Coexisting LEO Constellations Author(s): Chen Jiaxian, Jin Jin, Wang Youzheng Presenter: Chen Jiaxian, Tsinghua University, China
04	ET4485	Paper Title: Beam-Squint-Aware Hybrid Beamforming for Wideband Satellite OFDMA Author(s): Zhaoqi Liu, Zhou Bin, Tongtong Fu, Wei Zhang, Wei Yu Presenter: Zhaoqi Liu, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China
05	ET1023	Paper Title: Research on Underwater Quantum Key Distribution Access Based on Submarine Optical Cables Author(s): Yuanyuan Zhou, Shijie Zhong Presenter: Shijie Zhong, Naval University of Engineering, China
06	ET1034	Paper Title: RIS-Enabled Secure mmWave Directional Modulation Transmission and Optimal Power Splitting in Fluctuating Two-Ray Fading Channels Author(s): Qian Cheng, Xinsong Dong, Xiaonan Hou, Zhao Jin, Shengquan Li Presenter: Qian Cheng, National Key Laboratory on Near-Surface Detection, China
07	ET1066	Paper Title: Research on Data-Free Backdoor Threat for Spectrum Sensing Model under the Federated Learning Framework Author(s): Wanqing Zhang, Hongjun Wang, Xu Gan, Ruhao Jiang, Tao Wu



Presenter: Wanqing Zhang, National University of Defense Technology, China

08 ET1092

Paper Title: A Network Security Situation Prediction Method Based on PSO-TS-ATMixer

Author(s): Ziyi Zhao, Zihan Xiong

Presenter: Zihan Xiong, China Telecom Research Institute, China

09 ET2126

Paper Title: Wi-Fi CSI Reciprocity and Physical-Layer Key Generation in RIS-Assisted Directional Link

Author(s): Junjie Xu, Hailin Wang, Huifeng Ma

Presenter: Junjie Xu, Southeast University, China

10 ET2167

Paper Title: Intelligent Frequency Hopping Pattern Selection with Low Synchronization Overhead: A DRL-Based Block-Level Decision Approach

Author(s): Wenhui Liu, Yangyang Li, Songyi Liu, Lina Ning, Guoxin Li, Yuhua Xu

Presenter: Wenhui Liu, Army Engineering University of PLA, China

11 ET3343

Paper Title: Stackelberg Game-Based Covert Transmission with Joint UAV and IRS Assistance under Adaptive Detection Thresholds

Author(s): Yijie Luo, Yucheng Weng, Yang Yang, Yanan Xiong

Presenter: Yucheng Weng, Army Engineering University of PLA, China

12 ET3410

Paper Title: Energy-Efficient Optimized Resource Allocation Optimization Based on Distributed RSMA

Author(s): Xianpeng Wang, Jianmei Dai, Rong Xu, Qi Su

Presenter: Xianpeng Wang, Space Engineering University, China; Jianmei Dai, Space Engineering University, China; Rong Xu, Space Engineering University, China; Qi Su, Space Engineering University, China

13 ET4462

Paper Title: Attack-Source Matching and Feature Constraints in Adversarial Evasion of Network Intrusion Detectors

Author(s): Shuangju Zhou, Zhe Chen, Chengyao Ruan, Jingping Liang, Yingying Wu, Ning Zhang

Presenter: Shuangju Zhou, Shanghai Xiaoyuan Innovation Center, China

14 ET2168

Paper Title: CQF Scheduling Method for Massive Data on Edge Hardware Platforms

Author(s): Wenting Cai, Chucheng Wen, Shijie Li, Qin Sun, Junye Li

Presenter: Junye Li, China Southern Power Grid Company Limited, China

15 ET3256

Paper Title: A Kernel Reinforcement Learning Method for TSN-Aware 5G RAN Slicing

Author(s): Rongjian Shi, Bin Shen, Huizi Wang, Jialin Li, Jianquan Wang, Lei Sun

Presenter: Rongjian Shi, University of Science and Technology Beijing, China

16 **ET3403**

Paper Title: GABPO: Graph-Augmented BGP Policy Optimizer with Hierarchical Cross-Graph Attention for Autonomous Anycast CDN Management

Author(s): Octave Ringar, Sanembaye Adrien, Mbainaigeye Jérôme, Ahmed D. Kora, C. Aupetit-Berthelemot

Presenter: Octave Ringar, University of Moundou, Chad

17 **ET4448**

Paper Title: Load-Aware Communication and Retransmission Mechanisms for Time-Sensitive Networking

Author(s): Zhenfu Lin, Qin Sun, Shijie Li, Junye Li, Qiaohui Zhang

Presenter: Junye Li, China Southern Power Grid Company Limited, China

18 **ET4470**

Paper Title: Angular-Domain Offset in Product-Gray Beam Training: Reliability-Aided List Correction for Uniform Planar Arrays

Author(s): Lingfeng Guo, Weixia Zou, Mingyang Cui

Presenter: Lingfeng Guo, Beijing University of Posts and Telecommunications, China

19 **ET1021**

Paper Title: A Novel Photonics-Based Frequency-Hopping Scheme for Enhanced Optical Communication Security

Author(s): Guang Li, Ruohan Yin, Jianqing Li

Presenter: Guang Li, Guangdong Polytechnic of Science and Technology, China

20 **ET3300**

Paper Title: Underwater Time Signal Transfer Based on Single-Photon Detection with Soft-Decision Decoding

Author(s): Youming Deng, Peng Zhang, Guangkun Guo, Ke Liu, Dong Hou

Presenter: Dong Hou, University of Electronic Science and Technology of China, China

21 **ET3349**

Paper Title: Fast Cluster Head Recovery in Hybrid RF/FSO UAV Swarms with Liquid Neural Networks

Author(s): Simeng Feng, Mengsi Chi, Xiaoli Liu, Chenyan Gao, Baolong Li, Chao Dong, Qihui Wu

Presenter: Simeng Feng, Nanjing University of Aeronautics and Astronautics, China

22 **ET3360**

Paper Title: 133-Gbit/s Underwater Visible Light Communication Using a Ten-Wavelength Integrated Visible Laser Array

Author(s): Shuai Hu, Zhiwu Chen, Zhe Feng, Zengyi Xu, Yuning Zhou, Nan Chi

Presenter: Shuai Hu, Fudan University, China

23 **ET3393**

Paper Title: Pilot-Aided Broad Learning System Receiver for DUV Optical Wireless Communications: Testbed Implementation and Experimental Validation

Author(s): Yan Peng, Hao Huang, Xumin Gao, Zheng Shi

Presenter: Hao Huang, Nanjing University of Posts and



Telecommunications, China

24

ET3423

Paper Title: Optimal-Transport-Based FPA Centroid Estimation for Satellite-to-Ground Laser Communication

Author(s): Bin Wang, Xiaoyan Wang, Yuning Wang

Presenter: Bin Wang, Academy for Network & Communications of CETC, China

25

ET4471

Paper Title: Zynq-Based Heterogeneous Adaptive Digital Locking for Fiber-Optic Microwave Frequency Transfer

Author(s): Jingjing Luo, Peng Zhang, Dong Hou

Presenter: Dong Hou, University of Electronic Science and Technology of China, China

26

ET4509

Paper Title: A Simple Transceiver for MIMO Optical Intensity Channels: Beyond the QR-SIC Architecture

Author(s): Hengyu Cui, Ru-Han Chen, Jing Zhou, Shijun Zhu

Presenter: Hengyu Cui, Nanjing University of Science and Technology, China

27

ET2119

Paper Title: Full-Duplex Cooperative NOMA with Nonlinear Energy Harvesting: Short-Packet Performance

Author(s): Wenyan Qian, Mengyan Chen, Jing Yang

Presenter: Jing Yang, Yangzhou University, China

28

ET2132

Paper Title: Research on Intelligent Charge-Discharge Management System for Communication Equipment Rooms

Author(s): Jie Li, Yuan Fang, Zeyi Yang, Xinte Qi, Yang Liu, Ao Shen

Presenter: Jie Li, China Mobile Group Design Institute Co., Ltd., China

29

ET2193

Paper Title: GPRF: A Cross-Layer Routing Mechanism for High-Density FANETs via Geometric Filtering and Predictive Fuzzy-Reward Q-Learning

Author(s): Jiayi Yu, Yuanguo Bi, Yanbo Fan, Zhixiong Yan, Haolong Lv

Presenter: Jiayi Yu, Northeastern University, China

30

ET2190

Paper Title: Coverage-Probability-Driven Joint Height and Orientation Optimization for Multi-RIS and BS in Obstructed Regions

Author(s): Yunpeng Zhao, Qing Shen, Wei Cui

Presenter: Yunpeng Zhao, Beijing Institute of Technology, China

31

ET2229

Paper Title: Generalized Energy Efficiency Analysis for Dual-IRS-Aided ISCT Systems

Author(s): Fei Xu, Xueyan Cao, Shubing Wang

Presenter: Fei Xu, Inner Mongolia University, China

32

ET2240

Paper Title: Integrated Multi-Beam Scanning and Resource Optimization for RIS-Assisted Near-Field SWIPT

Author(s): Shuqi Li, Xueyan Cao, Fei Xu

Presenter: Shuqi Li, Inner Mongolia University, China



- | | | |
|----|---------------|--|
| 33 | ET3375 | <p>Paper Title: Experimental Validation of Millimeter-Wave Communication via a Spatiotemporally Modulated Metasurface Antenna</p> <p>Author(s): Haoxiong He, Yucheng Shen, Chen Zhang, Qingqing Chen, Li Ding</p> <p>Presenter: Haoxiong He, University of Shanghai for Science and Technology, China</p> |
| 34 | ET1016 | <p>Paper Title: Joint Optimization of 3D Placement and Resource Allocation for Multi-UAV Relay Systems in Urban Low-Altitude Environments</p> <p>Author(s): Yue Hu, Laixian Peng, Renhui Xu, Junbo Wang, Hai Wang</p> <p>Presenter: Yue Hu, Southeast University, China</p> |
| 35 | ET1063 | <p>Paper Title: Joint 3D Deployment and Bandwidth Allocation for Multi-UAV Base Stations in Emergency Scenarios</p> <p>Author(s): Ninghao Sima, Wenming Zhu, Tianyu Peng, Jing Hu, Qian Chen, Changhao Liu</p> <p>Presenter: Ninghao Sima, Army Engineering University of PLA, China</p> |
| 36 | ET1070 | <p>Paper Title: Topology Prediction-Based Routing for Flying Ad Hoc Networks</p> <p>Author(s): Hu Wanyang, Li Zhenhui, Song Weilong, Liu Yabo, Tian Weiming, Fang Chengyu, Deng Siyuan</p> <p>Presenter: Hu Wanyang, Zhejiang University, China</p> |
| 37 | ET1080 | <p>Paper Title: ST-ISAC: A Spatio-Temporal Independent Soft Actor-Critic Algorithm for UAV-Assisted Mobile Edge Caching</p> <p>Author(s): Jiahe Chai, Jun Cai, Wanqiu Chen, Bing Hu, Heting Wang, Yu Ni</p> <p>Presenter: Jiahe Chai, Academy of Military Sciences, China</p> |
| 38 | ET1094 | <p>Paper Title: Reliability-Aware Sparse Communication for Post-Disaster Multi-UAV Situational Assessment under Dynamic Interference</p> <p>Author(s): Senrui Huang, Haijun Wang, Haihong Wang, Zhe Wang, Jiao Zhang, Nan Li, Haitao Zhao</p> <p>Presenter: Senrui Huang, National University of Defense Technology, China</p> |
| 39 | ET1097 | <p>Paper Title: A Federated Prediction-Driven DDQN Collaborative Caching Framework for Internet of Vehicles</p> <p>Author(s): Xi Kang, Jiawen Mo, Lianhao Xue, Xiaopo Ouyang, Hui Song</p> <p>Presenter: Xi Kang, South China Normal University, China</p> |
| 40 | ET1109 | <p>Paper Title: Leader-Follower-Based UAV Formation Trajectory Planning: A Deep Reinforcement Learning Solution</p> <p>Author(s): Fei Wang, Yuanming Ge, Jiatong Li, Lijuan Zhang</p> <p>Presenter: Fei Wang, Nanjing University of Aeronautics and Astronautics, China</p> |
| 41 | ET2120 | <p>Paper Title: Time-Varying Popularity-Driven Dynamic Coalition Formation for RSU Cooperative Edge Caching</p> <p>Author(s): Libiao Yang, Ying Li, Chunlai Guo, Yujing He</p> |



Presenter: Yujing He, Harbin Cambridge University, China

42

ET2170

Paper Title: Satellite-Terrestrial Integrated Communication and Computing Resource Optimization for Low-Altitude Intelligent Networks

Author(s): Yong Lei, Xiaoxiao Zhuo, Yunbo Hu, Guyue Zhu, Yu Zhao, Liang Tang, Chenfeng Xu

Presenter: Yong Lei, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China

POSTER SESSIONS >>>

PS04: Aerial & Vehicular Networks, Special Session Topics and General Contributions

Session Chair: Simeng Feng, Nanjing University of Aeronautics and Astronautics, China

Time 16:00-18:00 | Oct. 18, 2026

Venue Poster Area-Meeting Room 8

No.	Paper ID	Presentation
01	ET2200	Paper Title: Multi-TRP Coherent Joint Transmission for Over-Tower Coverage Enhancement in Low-Altitude Intelligent Networks Author(s): Yun Ruoyu, Sun Shaohui, Kang Shaoli, Jia Mingyu, Wang Yekang, Chen Shanzhi Presenter: Yun Ruoyu, CICT Mobile Communication Technology Co., Ltd., China
02	ET2217	Paper Title: Beam-Sweep-Triggered Non-Stationary THz UAV-MIMO Channel Modeling with Shared Target-Scatterer Clusters for 6G ISAC Author(s): Zican Jiang, Yongjun Li, Kai Zhang Presenter: Zican Jiang, Air Force Engineering University, China
03	ET3294	Paper Title: Degradation-Aware Routing and Spectral-Constrained Restoration for SAR Images with Compound Degradations Author(s): Wenzhao Zhou, Aijun Liu, Kegang Pan, Xin Lin, Liangdong Wei Presenter: Aijun Liu, Army Engineering University of PLA, China; Kegang Pan, Army Engineering University of PLA, China; Xin Lin, Army Engineering University of PLA, China; Liangdong Wei, Army Engineering University of PLA, China
04	ET3315	Paper Title: Location Aided Prediction of Type II Spatial Codebook Basis for Reduced Search Beam Refinement Author(s): Yekang Wang, Shanzhi Chen, Shaoli Kang, Chuan Jiang, Mingyu Jia, Ruoyu Yun Presenter: Yekang Wang, CICT Mobile Communication Technology Co., Ltd., China
05	ET3329	Paper Title: D3QN-Based UAV Trajectory Planning for IoT Data Collection in Partially Known Urban Environments Author(s): Jinghao Wang, Jihao Luo, Feng Su, Changqing Zhang, Wenjing Wang, Chunlei Wang Presenter: Jinghao Wang, Beijing Institute of Technology, China
06	ET3331	Paper Title: Radio-Map-Aware UAV Path Planning in Low-Altitude Cellular Networks via an Improved Snake Optimizer Author(s): Chenxi Li, Jie Tang, Junyuan Fan, Xiaokai Song, Wanmei Feng, Cui Yang Presenter: Chenxi Li, South China University of Technology, China



- | | | |
|-----------|---------------|--|
| 07 | ET3347 | <p>Paper Title: Electromagnetic Digital Twin-Assisted Multi-UAV Trajectory Planning for Low-Altitude Scenarios</p> <p>Author(s): Jingwang Ke, Jie Tang, Youjun Xiang, Xiaokai Song, Wanmei Feng, Cui Yang</p> <p>Presenter: Jingwang Ke, South China University of Technology, China</p> |
| 08 | ET3394 | <p>Paper Title: PLD-YOLO: A High-Precision Framework for Aerial Object Detection with Lossless Feature Retention</p> <p>Author(s): Weishuai Qin, Xueyan Han, Shuangle Guo, Xueyu Han, Kai Feng, Yongzhi Sun</p> <p>Presenter: Weishuai Qin, Shandong University of Aeronautics, China</p> |
| 09 | ET4433 | <p>Paper Title: Anomaly Detection of UAV Swarm Communication Topology Based on Graph Contrastive Learning</p> <p>Author(s): En Liu, Yiwei Lu, Bo Huang</p> <p>Presenter: En Liu, National University of Defense Technology, China</p> |
| 10 | ET4492 | <p>Paper Title: Joint UAV and Channel Selection in Distributed Air-Ground Networks: A Distance-Modulated No-Regret Learning Algorithm</p> <p>Author(s): Shiwei He, Runfeng Chen, Jihao Cai, Tianyao Zhong, Ao Ma, Zhijun Hou, Hongtao Zhu</p> <p>Presenter: Shiwei He, Army Engineering University of PLA, China</p> |
| 11 | ET4496 | <p>Paper Title: Hierarchical Deep Reinforcement Learning-Based Energy-Aware Multi-Channel Routing for UAV-Assisted Ground Communications</p> <p>Author(s): Siyi Liu, Rongrong He, Songyi Liu, Guoxin Li, Xueqiang Zheng</p> <p>Presenter: Siyi Liu, Army Engineering University of PLA, China</p> |
| 12 | ET2174 | <p>Paper Title: A PDD-Based Algorithm for PAPR Minimization in AFDM Waveform</p> <p>Author(s): Hehao Niu, Shuying Lin, Xiaoshi Wu</p> <p>Presenter: Xiaoshi Wu, National University of Defense Technology, China</p> |
| 13 | ET3340 | <p>Paper Title: Robust and Covert Transmission Design for Active RIS-Assisted ISAC Systems with Hardware Impairments</p> <p>Author(s): Siyu Li, Yulong Zou, Libao Yang, Shuying Lin, Qingxin Yan</p> <p>Presenter: Xiaoshi Wu, National University of Defense Technology, China</p> |
| 14 | ET2165 | <p>Paper Title: Hierarchical Reinforcement Learning for Cognitive Radio Multi-Channel Spectrum Access and Heterogeneous Services Resource Allocation</p> <p>Author(s): Chengcheng Si, Jianzhao Zhang, Zhuo Lu</p> <p>Presenter: Chengcheng Si, National University of Defense Technology, China</p> |
| 15 | ET2171 | <p>Paper Title: Lexicographic QoS-Aware Optimization for Joint UAV-BS Deployment and User Association in Post-Disaster Emergency Communications</p> <p>Author(s): Peiwen Shi, Aijun Liu, Xinhai Tong, Kegang Pan, Xin Xu, Xin Lin</p> |



		Presenter: Peiwen Shi, Army Engineering University of PLA, China
16	ET3252	Paper Title: Optimal Time-Frequency Power Allocation for Covert OTFS Communications Author(s): Qiang Yu, Ying Huang, Jing Lei, Junjie Zeng, Luying Huang Presenter: Junjie Zeng, National University of Defense Technology, China
17	ET3285	Paper Title: Physically Interpretable Modulation Recognition Attack via Multi-Task Decision Author(s): Minghui Gao, Binqun Zhang, Xiaogang Tang, Lu Wang, Hongji Xing, Runhao Ji Presenter: Minghui Gao, Space Engineering University, China
18	ET4511	Paper Title: Jamming-Aware Optimal Hopping Rate for Satellite Frequency-Hopping Systems Author(s): Peng Wei, Zhihao Zhang, Huiping Zhu, Shijun Xie, Aidai Zhu Presenter: Peng Wei, National University of Defense Technology, China
19	ET3272	Paper Title: Dynamic Priorities-Oriented Task Offloading and Scheduling in Self-Organized Air-Ground Collaborative Mobile Edge Computing Author(s): Wensheng Zhao, Weihao Sun, Hai Wang, Hanlin Yu Presenter: Wensheng Zhao, Army Engineering University of PLA, China
20	ET2161	Paper Title: A General Spatial Non-Stationary Channel Estimation for Massive MIMO System Author(s): Bin Xiang, Yang Liu, Cheng-Xiang Wang, Yu Yu Presenter: Bin Xiang, Jiangnan University, China
21	ET3255	Paper Title: AI-Driven Radio Map Reconstruction Based on Crowdsensing Author(s): Yanrong Ye, Hongjun Wang, Chunsheng Liu Presenter: Yanrong Ye, National University of Defense Technology, China
22	ET3287	Paper Title: Design and Optimization of Optical Cross Wavelength Division Multiplexing Based on Optical Thin Film Interference Author(s): Haitao Chen, Wenjun Su, Youcheng Liang Presenter: Haitao Chen, Guangzhou Civil Aviation College, China
23	ET3425	Paper Title: Sparse CW Measurement Strategies for Cost-Efficient Target-Site Calibration Author(s): Mengqi Liu, Mengyuan Zhu, Fangzhou Ye, Guangpei Zhong, Guoqing Li Presenter: Mengqi Liu, China Information Technology Design & Consulting Institute Co., Ltd., China
24	ET4436	Paper Title: A Distributed TFSHA Framework for Handover Decision in Integrated Terrestrial-Satellite Networks Author(s): Hengrui Hu, Guangtai Li, Jiahao Liu, Zhengda Li, Wenjing Cao, Wenjin Wang Presenter: Hengrui Hu, Southeast University, China; Guangtai Li, Southeast



		University, China
25	ET3365	Paper Title: Value-Aware Collaboration in Multi-Agent Systems: Communication Scheduling for Long-Horizon Video Understanding Author(s): Chenrong Meng, Xiaopeng Lyu, Yini Zhang, Lei Yu, Zheng Wei, Rui Min Presenter: Chenrong Meng, E-surfing Vision Technology Co., Ltd., China
26	ET4456	Paper Title: Real-Time Deployment of a Hybrid Intelligent HI-RAN AI Energy-Saving Solution in 5G Cellular Networks: An Ultra-Large-Scale Case Study Author(s): Chenyu Shao, Hongjun Tang, Qiming Wang, Kang Wang, Huihui Zhao, Lin Yan Presenter: Chenyu Shao, ZTE Corporation, China
27	ET2172	Paper Title: SNR-Conditioned Diffusion Denoising for Channel-Adaptive Massive MIMO CSI Feedback Author(s): Bin Liu, Hua Yu, Pucong Wang Presenter: Bin Liu, South China University of Technology, China
28	ET3297	Paper Title: A Cyclic Shift Based PTS Technique for PAPR Reduction in OFDM Systems Author(s): Bin Sheng Presenter: Bin Sheng, Southeast University, China
29	ET3354	Paper Title: PAPR-Constrained Waveform Optimization for MIMO-OFDM SWIPT via Tone Reservation Author(s): Yufei Ding, Chongda Huang, Yue Xiao, Tiebin Wang, Yubing Wang Presenter: Yufei Ding, Northeast Forestry University, China
30	ET4483	Paper Title: Adaptive-Reward Deep Reinforcement Learning for Joint Computing and Optical Resource in SDM-EONs Author(s): Jing Jiang, Jiale Fu, Jingchi Cheng Presenter: Jing Jiang, Xidian University, China
31	ET2137	Paper Title: Knowledge Graph-Enhanced Multi-Modal UAV Semantic Communications for Low-Altitude Economy Author(s): Hongzheng Wang, Yifeng Zhao, Liaowei Chen, Wanxue Li, Mingshu Chen, Xiaokang Fu, Lianfen Huang Presenter: Hongzheng Wang, Xiamen University, China
32	ET3280	Paper Title: Research on AI Agent Empowered 6G Integrated Sensing and Communication Systems Author(s): Mao Zhijie, Li Wenchen, Shi Lichun Presenter: Mao Zhijie, Shandong Xiehe University, China;
33	ET3303	Paper Title: Human-Supervised Agentic Delivery Orchestration for Wireless Network Rollouts



Author(s): Fangping Sun, Gongcun Hong, Qiming Suo, Ruoyu Wang
 Presenter: Lin Yan, ZTE Corporation, China

34 **ET3307**

Paper Title: Anisotropic Flow Matching for 3D Radio Map Reconstruction from Sparse Measurements

Author(s): Bowen Zhu, Pan Zhen, Guang Yang, Zihao Pan, Ning Yang, Daoxing Guo

Presenter: Bowen Zhu, Army Engineering University of PLA, China

35 **ET3334**

Paper Title: A Few-Sample Digital Predistortion Modeling Method Based on Two-Stage Sample Selection

Author(s): Xiaoyu Wang, Dewei Zhang, Jiale Wu, Yunxiang Zhang, Hailin Deng

Presenter: Xiaoyu Wang, Information Engineering University, China

36 **ET3369**

Paper Title: Frequency-Agile All-Digital RF Modulation Algorithm Based on VbPWM

Author(s): Xuran Song, Qiang Zhou, Lei Zhu, Mingqi Wang, Yichao Ha, Xin Shi

Presenter: Xuran Song, National University of Defense Technology, China

37 **ET3376**

Paper Title: PGPR-DSA: A Protocol-Guided Preamble Reconstruction with Drift-Simulated Augmentation Scheme for Cross-Time RFFI

Author(s): Ximeng Lin, Yanqing Zhao, Ying Ma, Haichuan Ding, Danping He

Presenter: Ximeng Lin, Beijing Institute of Technology, China

38 **ET3395**

Paper Title: Curriculum-Driven Graph Reinforcement Learning for Low Earth Orbit Satellite Routing

Author(s): Haoyang Wang, Haoye Chai, Jie Sun, Mugen Peng

Presenter: Haoyang Wang, Beijing University of Posts and Telecommunications, China

39 **ET3418**

Paper Title: Frame-Level Deadline Risk-Aware MATD3 for Freshness-Oriented Communication-Computation Scheduling in Infrastructure-Free Platoons

Author(s): Sheng Qi, Laixian Peng, Renhui Xu, Xiaoxuan Chen, Xiazha Li, Zhengqin Xu

Presenter: Sheng Qi, Army Engineering University of PLA, China

40 **ET3362**

Paper Title: Online Edge Digital Twin Placement in Vehicular Computing Power Networks

Author(s): Yuhao Cen, Yongbang Lin, Shiqiang Wu, Li Jiang, Yi Liu, Le Chang, Ke Zhang, Fan Bo

Presenter: Yuhao Cen, Guangdong University of Technology, China

ONLINE SESSIONS >>>

OS01: Signal Processing and Integrated Sensing and Communication

Session Chair: Chuanting Zhang, Shandong University, China

Time 13:30-16:05 | Oct. 18, 2026

Venue Room A
Zoom ID: 86863206117
Password: 101618

INVITED TALK | 13:30-13:50

Environment-Aware Network-Level Design for Pinching-Antenna Systems

Yanqing Xu, CUHK-Shenzhen, China



Abstract: Pinching-antenna (PA) systems enable a reconfigurable radiation point along a guided medium, offering a new degree of freedom beyond conventional fixed-aperture deployments. While most existing studies focus on link-level optimization for quasi-static users, such designs typically require frequent re-computation as users move or enter/leave the network, and they do not directly capture area-oriented objectives (e.g., region-wide coverage and hotspot service) that evolve on a longer time scale. This talk presents an environment-aware, region-level design framework for PA systems that shifts the objective from serving specific instantaneous users to shaping area coverage and hotspot service over longer time scales. In particular, we consider two representative settings: traffic-aware and geometry-aware. In the traffic-aware case, we model spatial demand using slowly varying hotspot profiles and optimize the activation/positioning of pinching points to align the radiated energy with traffic intensity, together with resource allocation to balance hotspot performance across the service region. In the geometry-aware case, we incorporate site-map information such as obstacles and visibility constraints into the network metric, and optimize pinching-point deployment to mitigate blockage-induced coverage holes. For each setting, we formulate a region-level optimization problem, develop low-complexity structure-exploiting algorithms, and quantify the performance-overhead tradeoff associated with antenna reconfiguration. Simulation results demonstrate that environment-aware PA design can substantially improve region-wide coverage and hotspot service quality compared to fixed-aperture baselines and user-driven link-level heuristics, especially in obstructed environments or highly non-uniform traffic scenarios.

TALK DETAILS

Time	Presentation
13:50-14:05	Paper Title: An Adaptive Multi-Modal Fusion Framework for Reliable Beam

**ET1006**

Prediction

Author(s): Jiabao Deng, Xinzhong Su, Youyun Xu

Presenter: Jiabao Deng, Nanjing University of Posts and Telecommunications, China

Abstract: Reliable beam alignment is a prerequisite for establishing high-throughput millimeter-wave communication links. Although deep learning-based beam prediction using multimodal data has shown potential, existing methods often struggle to cope with complex and dynamic environments. Recognizing this limitation, we propose an adaptive multimodal beam prediction (MMBP) method. Specifically, we design a spatiotemporal backbone to capture continuous environmental dynamics, and introduce a dynamic modality gate mechanism to adaptively calibrate sensor weights, effectively preventing modality co-adaptation. Furthermore, a Global Positioning System (GPS)-guided cross-attention module is deployed to query the most relevant environmental contexts based on ego-vehicle kinematics. Extensive evaluations on the DeepSense 6G dataset demonstrate that the proposed MMBP method significantly outperforms baseline method, achieving an overall Distance-Based Accuracy (DBA) of 90.64%.

Paper Title: 2D-Chirp Low-PAPR Pilot Optimization Strategy for OTFS Channel Estimation

Author(s): Kequan Duan, Meng Tang, Peng Liu, Chuixiang Meng

Presenter: Kequan Duan, Yunnan University, China

**14:05-14:20
ET1008**

Abstract: Conventional impulse-based pilot channel estimation methods in orthogonal time frequency space (OTFS) systems lead to high peak-to-average power ratio (PAPR). We resolve this challenge by designing a constant-modulus pilot based on a two-dimensional chirp (2D-chirp) sequence. We prove that the 2D-chirp has periodic autocorrelation, enabling a highly efficient two-stage channel estimator. The estimator first employs correlation screening based on the 2D-chirp to effectively reduce the path search space, then refines the channel information using an improved refinement scheme, designated as the fast iterative shrinkage-thresholding debiasing algorithm. Simulation results validate that our approach achieves superior channel estimation accuracy with low complexity.

Paper Title: A Flip-Efficient Fast-SCF Decoder Architecture for Latency Reduction

Author(s): Minghan Xie, Mingsheng Xu

Presenter: Minghan Xie, Zhejiang University, China

**14:20-14:35
ET1032**

Abstract: The successive cancellation flip (SCF) decoder approaches the error-correction performance of the successive cancellation list (SCL) decoder while retaining a complexity close to that of the successive cancellation (SC) decoder. To improve decoding efficiency, we introduce a simplified log domain bit-flipping metric into the fast successive-cancellation flip



(Fast-SCF) algorithm; adding a sequential-penalty metric improves decoding performance with negligible hardware overhead, reduces the number of flips, and raises flipping efficiency. Based on this algorithm, we propose a low-latency Fast-SCF hardware architecture. Using an all-frozen-bit-node identifier in the instruction set, the architecture performs a stall-free bypass of arbitrary-length all-frozen-bit sub-nodes (Rate-0 nodes) that works in concert with a look-ahead computation mechanism, forming a dual-acceleration strategy that reduces the decoding clock cycles. Synthesized in 28-nm CMOS, the decoder occupies 0.047 mm² and reaches an average throughput of 2547 Mbps. Compared with state-of-the-art SCF decoders, it achieves the smallest silicon area, a competitive worst-case latency, and the highest average and worst-case area efficiency.

Paper Title: Low-Complexity Beamforming for Active RIS-Aided Sensing-Constrained ISAC

Author(s): Yuxin Wang, Boyi Tang, Xiu Yin Zhang

Presenter: Yuxin Wang, South China University of Technology, China

**14:35-14:50
ET1101**

Abstract: Active reconfigurable intelligent surfaces (RISs) alleviate the double-fading bottleneck in passive RIS-aided integrated sensing and communication (ISAC) systems, but they also introduce amplified thermal noise and a more challenging joint beamforming problem. This paper investigates sensing-constrained sum-rate maximization for active RIS-aided ISAC under a radar signal-to-noise ratio (SNR) constraint for detection and a Cramer-Rao bound (CRB) constraint for estimation. We develop structured low-complexity alternating solvers that avoid repeated interior-point optimization. For the SNR branch, the BS beamformer is updated through an eigen-domain KKT step and the RIS coefficients through box-constrained coordinate descent. For the CRB branch, we further incorporate a penalty-based auxiliary-matrix approximation and active-noise-aware Fisher information evaluation. The resulting structure also enables robust online tracking under bounded channel uncertainty. Simulations show runtime reductions of 676 $\times$ and 81 $\times$ for the SNR and CRB branches, with average sum-rate gaps of only 0.57 and 1.06 bps/Hz, respectively, relative to the interior-point baseline. Under 5% BS-RIS channel uncertainty, the robust tracker improves the mean certified worst-case sum-rate by 38.5% while meeting the latency deadline in every slot.

**14:50-15:05
ET2160**

Paper Title: Wavenumber Domain Channel Reconstruction for Asymmetrical Systems

Author(s): Chao Liu, Jiacheng Lu, Jun Zhang, Qi Zhang, Yi Wu

Presenter: Chao Liu, Nanjing University of Posts and Telecommunications, China

Abstract: This work investigates the downlink channel reconstruction for asymmetrical systems. Compared to existing works based on symmetrical systems, we efficiently estimate the downlink channel using only a subset of antennas.



Specifically, a coprime array is adopted to construct a full-aperture virtual array from the uplink channel covariance matrix. Based on the cluster sparsity in the wavenumber domain, a compressed sensing problem is formulated, and a fused-Lasso-based alternating direction method of multipliers is proposed to estimate the wavenumber-domain channel parameters. Simulations show that the proposed method achieves higher accuracy than existing algorithms, demonstrating its superiority in channel reconstruction for asymmetrical systems.

Paper Title: Robust Through-Wall WiFi Human Tracking under Dynamic Interference via Beamforming and HCRF

Author(s): Ying Yang, Shuang Zhou, Zijun Han, Shurong Ge

Presenter: Ying Yang, Beijing University of Posts and Telecommunications, China

14:05-15:20
ET2187

Abstract: WiFi-based human trajectory tracking has emerged as a promising technology with broad applications in smart security, smart homes, and emergency rescue, owing to its non-contact feature and ubiquitous deployment capability. However, in through-wall scenarios, severe signal attenuation (up to tens of dB) and complex indoor dynamic multipath interference (e.g., moving pets) cause critical challenges for robust human trajectory tracking. To address these issues, this paper proposes a robust through-wall WiFi human trajectory tracking scheme. First, we construct a two-dimensional (2D) Angle of Departure (AoD) and Angle of Arrival (AoA) spatial spectrum via omnidirectional beam sweeping and cross-beam spectrum stitching. The obtained spectrum is then utilized to compute candidate coordinates. Second, we propose an initial trajectory estimation algorithm based on the Hidden Conditional Random Field (HCRF) to obtain the true trajectory from these interference-corrupted candidates. Finally, we establish an adaptive closed-loop tracking architecture based on Kalman filtering and spatial beam steering. This architecture dynamically enhances the human-reflected signal and extracts precise AoA and Doppler Frequency Shift (DFS) to compute the target position, ultimately achieving robust and high-precision trajectory tracking. Performance evaluations confirm a median tracking error of merely 0.42 m, delivering sub-meter high-precision tracking and surpassing existing baselines with stable performance in complex through-wall environments.

Paper Title: Joint Dimensionality Reduction of Dual-Stream Video Latents with Post-Training Digital Channel Evaluation

Author(s): Zhiheng Zhang, Weixi Zhou

Presenter: Weixi Zhou, Sichuan Normal University, China

15:20-15:35
ET3413

Abstract: With the increasing demand for efficient multi-stream video representations, independently retaining a prescribed latent for each input causes aggregate dimensionality to grow with the number of streams. We refer to our method as Dual-Stream Joint Latent Allocation (DS-JLA), which investigates learnable joint allocation for two separately reconstructable videos under a fixed



total latent-dimensionality budget, without assuming pixel correspondence or temporal alignment. A parameter-shared encoder first constructs two reconstruction-aware latents. A joint mapping module $C\phi$ transforms them into one bottleneck with a prescribed dimension, and an ordered recovery module $D\psi$ recovers the two stream-specific latents for decoding. Experiments on UCF101 and Vimeo-90K evaluate the proposed representation, while four UCF101 operating points exhibit a monotonic dimensionality–quality trade-off. At the matched 480-channel budget, joint r2 achieves 36.43 dB, compared with 33.75 dB for an independently partitioned baseline and 31.74 dB for a common–private baseline. Post-training quantization and uncoded digital-channel experiments are used only as offline sensitivity diagnostics. These results support learnable joint allocation of a fixed latent dimension for two independently reconstructable streams within the evaluated setting.

Paper Title: Towards Modulation-Robust Radio Frequency Fingerprint Identification via Contrastive Learning

Author(s): Jiahao Chen, Zhuo Sun, Ying Wang, Hao Ma

Presenter: Jiahao Chen, Beijing University of Posts and Telecommunications, China

15:35-15:50
ET3274

Abstract: Radio frequency fingerprint identification (RFFI) identifies individual transmitters from device-specific hardware impairments. A major challenge arises when the transmitter changes its modulation type, which leads to severe performance degradation for deep-learning-based RFFI methods. The key reason is that modulation variation may shift the statistic structure of the signal more dramatically than the subtle hardware-dependent distortions that constitute the fingerprint. To address this issue, we first derive an IQ-domain distortion model and show that, under reasonable assumptions, the received signal can be approximately decomposed into modulation-dependent and transmitter-dependent components. This result motivates an effective input representation for constructing a modulation-robust RFFI system. We then propose a contrastive-learning-based framework that aligns features of signals emitted by the same transmitter under different modulations, enabling the network to learn RFF features that are less sensitive to modulation characteristics. Experiments on real signals collected from satellite modems show that, compared with a conventional supervised baseline, the proposed method substantially improves closed-set transmitter identification for modulation types unseen during training, which makes it more practical and scalable for deployment.

15:50-16:05
ET2239

Paper Title: Fast Sparse Reconstruction with Enhanced FISTA on GPU for Handheld mmWave Radar

Author(s): Yiran Hou, Xiaodong Xu, Xiaowei Qin

Presenter: Yiran Hou, University of Science and Technology of China, China

Abstract: Terminal-side millimeter-wave radar exhibits significant potential for



environmental sensing in 6G Integrated Sensing and Communication (ISAC) networks. In handheld operation, real-time visual feedback is essential for pose adjustment and local spatial awareness. However, achieving sub-second image reconstruction remains challenging for existing methods due to the computational bottleneck of large-scale matrix inversion. To address this issue, we propose a fast sparse reconstruction method based on the MMV-FISTA framework, specifically tailored for GPU platform. We formulate the sparse recovery problem induced by the downsampled scanning mode as an optimization problem, which replaces the costly matrix inversions with dense matrix multiplications well-suited for GPU parallelism. A speed restarting mechanism is integrated to suppress Nesterov momentum oscillations, and an adaptive homotopy strategy is designed to mitigate shrinkage bias inherent in soft thresholding. Simulations demonstrate that the proposed method reduces average runtime by 27.1% and 65.7% compared to SAMP and standard FISTA, respectively, while improving PSNR by 2.42 dB over SAMP, and achieving a comparable high-fidelity performance to standard FISTA.





ONLINE SESSIONS >>>

OS02: AI for Communications and Emerging Computing Paradigms

Session Chair: Yifeng Lyu, Institute of Computer Application Technology, Norinco Group

Time 13:30-15:45 | Oct. 18, 2026

Venue Room B
Zoom ID: 86890280564
Password: 101618

TALK DETAILS

Time	Presentation
13:30-13:45 ET901	Paper Title: Towards Compressed SRv6 for Multi-Hop LoRa-Based LPWANs Author(s): Angus Jull, Hannah Selden, Brian Tran, Chung-Horng Lung Presenter: Chung-Horng Lung, Carleton University, Canada Abstract: Low-power wide-area networks (LPWANs) facilitate communication between low-power devices over several kilometers. Standard LPWANs and specialized protocols often limit flexibility and interoperability with other networks. Using Segment Routing over IPv6 (SRv6) in LPWANs could enhance network programmability, improve interoperability, and reduce resource-intensive per-node routing state. Usually, the large header required by SRv6 makes it incompatible with the limited maximum transmission units (MTUs) of LPWAN radios. This paper demonstrates how SRv6 can be adapted to LPWANs by combining LoRa radios with the IEEE 802.15.4 data link layer and 6LoWPAN. The novel use of 6LoWPAN Generic Header Compression, specifically, allows compression of SRv6 headers to an acceptable size. We demonstrate the feasibility of this method by designing a testbed based on the RIOT operating system and Heltec ESP32 LoRa hardware. We then conduct simulations of the SRv6-based solution across various topologies and larger network sizes for preliminary analysis of traffic engineering using SRv6 for scalability in IoT networks. Results from both the physical testbed and simulations indicate that our proposed approach is feasible and offers benefits for LPWAN-based IoT networks. Notably, the proposed approach reduces the SRv6 header size from 72 to 21 bytes for four SRv6 segments in the testbed and enables traffic engineering that lowers the maximum depletion of batteries in a simulation environment by 32%.
13:45-14:00 ET902	Paper Title: Spatio-Temporal Graph Attention Networks for Realtime UE Prioritization in Cloud-Native 5G/B5G Edge Deployments Author(s): Alireza Yaghoobi, Chung-Horng Lung Presenter: Chung-Horng Lung, Carleton University, Canada Abstract: Cloud-Native Functions (CNFs) leverage containerized microservices to offer superior scalability and deployment agility over traditional Virtual Network



Functions (VNFs). However, managing distributed CNFs on resource- constrained edge devices while accommodating dynamic user equipment (UE) mobility remains a challenge. Traditional static slice assignments fail to adapt to real-time network fluctuations, necessitating rapid, localized traffic classification at the edge. To address this, we propose Spatio-Temporal Multi-head Graph Attention Networks (ST-mGAT) for unsupervised UE clustering and real-time traffic prioritization using client-side context features like speed and signal qualities. Our architecture is implemented within a fully cloud-native edge testbed and maps spatial neighbor topologies and sequential temporal dynamics to classify UEs into distinct priority tiers. Our evaluation on a realistic 5G dataset shows that ST-mGAT effectively identifies highly fluid Semi-Priority (SE) traffic boundaries. This flexible clustering enables microservices to proactively balance loads, reducing CPU overhead at the edge while ensuring quality of service without the Northbound Interface bottlenecks typically found in traditional SDN or VNFs

**14:00-14:15
ET1086**

Paper Title: Energy-Efficient Edge Intelligence for Motion-Aware Data Valuation in Autonomous Driving

Author(s): Pingping Xu, Chunhui Feng, Haihui Xie, Shuwu Chen, Zhaogang Shu

Presenter: Pingping Xu, Fujian Agriculture and Forestry University, China

Abstract: The convergence of the low-altitude economy and autonomous driving accelerates the evolution toward mobile edge intelligence. Within this trend, distinct driving scenarios generate datasets of widely varying information density, creating a fundamental contradiction between the massive sensory data produced by vehicles and the limited wireless and computational resources at the edge. To address this issue, this paper proposes a motion-aware value-weighted resource allocation scheme. In particular, we first introduce a dynamic weighting mechanism that quantifies data value through multi-modal kinematic prediction errors. Then, we formulate an effective-information maximization problem and develop a distributed iNner cOnVex Approximation (NOVA) algorithm via convex surrogate construction and dual decomposition. Extensive numerical results, along with validation on the CARLA high-fidelity autonomous driving simulator, corroborate that the proposed framework accurately identifies high-dynamics moments and concentrates resources on critical samples, enabling more efficient communications for edge intelligence compared with state-of-the-art benchmark algorithms.

**14:15-14:30
ET1105**

Paper Title: A Reachability-Scale-Based Geometric Stateless Routing Protocol for 3-D Underwater Wireless Sensor Networks

Author(s): Sisi Liu, Lei Yan

Presenter: Sisi Liu, Northeastern University, China

Abstract: Three-dimensional underwater wireless sensor networks (3-D UWSNs) require lightweight routing mechanisms capable of maintaining delivery



reachability under severe multipath propagation and time-varying acoustic channels. Conventional geometric stateless routing primarily relies on local position information and may therefore select links with poor transmission quality. To address this issue, this paper proposes a reachabilityscale-based geometric stateless routing protocol, termed RS-GSTAR, for 3-D UWSNs. The key idea is to map channel-stateinformation (CSI)-derived link quality into a distance-like reachability scale, which serves as a reliability constraint for candidate relay filtering. Among the reliable candidates, the next-hop relay is selected according to geographic progress toward the destination, thereby preserving the distributed and low-complexity nature of geometric routing. To evaluate the transmission quality of the selected links under doubly selective channels, a basis expansion model (BEM) and pilot-symbol-assisted modulation (PSAM) are employed for channel estimation, equalization, and bit error rate (BER) calculation. Simulation results show that RSG-STAR reduces the average BER, weak-link ratio, and worsthop BER tail risk while maintaining a high routing success rate, at the cost of a moderate increase in hop count.

Paper Title: BA-RAG-CsiNet: Bayesian Attention-Based Retrieval-Augmented CSI Feedback Reconstruction for FDD MIMO-OFDM Systems

Author(s): Zihan Li, Lina Qi

Presenter: Zihan Li, Nanjing University of Posts and Telecommunications, China

14:30-14:45
ET2129

Abstract: Channel state information (CSI) feedback is essential for downlink precoding, beamforming, and resource allocation in frequency-division duplexing (FDD) MIMO-OFDM systems. However, as the number of antennas and subcarriers increases, the dimension of CSI grows rapidly, leading to prohibitive feedback overhead. Although CsiNet provides an effective deep learning-based CSI compression and reconstruction framework, its reconstruction performance degrades at low latent dimensions because the compressed representation contains limited channel information. To address this problem, a Bayesian attention-based retrieval-augmented CSI reconstruction method, termed BA-RAG-CsiNet, is proposed based on the CsiNet backbone. The proposed method constructs a historical CSI database containing user locations, compressed latent variables, and ground-truth CSI matrices. For each target sample, candidate historical CSI samples are retrieved according to physical distance, and Bayesian attention jointly models latent semantic similarity and spatial prior information. The retrieved CSI features are integrated with the preliminary CsiNet reconstruction through a residual fusion network and a dynamic gating mechanism. Simulation results on the COST2100 dataset show that BA-RAG-CsiNet consistently outperforms the base CsiNet in both Indoor and Outdoor scenarios. The maximum NMSE gains reach 4.25 dB and 1.29 dB, respectively, demonstrating the effectiveness of retrieval-augmented reconstruction under limited latent dimensions.



14:45-15:00
ET2140

Paper Title: Joint Beamforming Design for a BD-SIM Enabled Multiuser ISAC System
Author(s): Wei He, Jun Zhang, Qiu Xia, Yi Wu
Presenter: Wei He, Nanjing University of Posts and Telecommunications, China

Abstract: Stacked intelligent metasurfaces (SIM) can perform wave domain signal processing during electromagnetic wave propagation, which improves processing efficiency and reduce radio frequency hardware costs in integrated sensing and communication (ISAC) systems. However, conventional reconfigurable intelligent surfaces based SIM architectures rely on diagonal phase shift control, limiting their design flexibility and wave domain processing capability. To address this issue, we propose a multiuser ISAC transmission scheme accompanied by a beyond diagonal stacking intelligent metasurface (BD-SIM). The BD-SIM is deployed at the front end of the base station antenna array to form a hybrid beamforming architecture for multiuser communication and target sensing. We analyze the sensing mutual information (SMI) and formulate a joint optimization problem to maximize the SMI under multiuser achievable rate and transmit power constraints. To solve this complex problem, an alternating optimization algorithm is developed, where the BD-SIM phase shift matrices and the digital precoder are optimized alternately. Simulation results show that the proposed scheme outperforms benchmark schemes and achieves improved sensing performance with increased transmit power and stacked layers.

15:00-15:15
ET3298

Paper Title: LLM-Guided Mechanism Search for Lightweight Automatic Modulation Classification
Author(s): Jiwei Zhou, Nan Li, Yunling Yang, Yangjie Liao, Wei Wang
Presenter: Jiwei Zhou, National University of Defense Technology, China

Abstract: Automatic modulation classification (AMC) models often rely on manually designed signal-processing mechanisms, whereas conventional neural architecture search (NAS) restricts candidates to predefined operators. We present a large language model (LLM)-guided mechanism search framework that generates executable components inside a quality-diversity NAS loop. At each generation, a quality-diversity upper-confidence-bound (QD-UCB) scheduler selects one of five design dimensions. The LLM then proposes a component from parent code, archive exemplars, component-contract validation failures, and distilled motifs. Component-contract validation filters invalid programs before short-training evaluation and multi-dimensional archive of phenotypic elites (MAP-Elites) archiving. Two candidates selected from separate search executions achieve mean accuracies of 64.12% and 63.87% on RadioML2016.10a, and 65.22% and 65.20% on RadioML2016.10b after promotion. They use 738K and 197K parameters: 57–98% fewer than baselines above 1M parameters, while exceeding all compact baselines (15K–253K) by 0.5–7.3 points. In the recorded search trajectories, feedback-enabled configurations are associated with higher best



validation accuracy and broader archive coverage.

Paper Title: CNN-Transformer Hybrid Network for Multi-Station Localization and Motion-State Classification

Author(s): Xiaowei Dong, Jiexin Yin, Shang Gao, Gaoyuan Yang, Fulin Wang

Presenter: Xiaowei Dong, Information Engineering University, China

**15:15-15:30
ET4473**

Abstract: Accurate localization and motion-state recognition of maritime and aerial targets are vital for national-defense reconnaissance, air-defense, and anti-missile systems. Conventional multi-station localization methods suffer from poor multipath resilience, insufficient positioning precision, error accumulation, and the inability to identify target motion states simultaneously. This paper presents a multi-station direct-position-determination (DPD) algorithm based on a CNN-Transformer hybrid network to realize collaborative multi-task processing for target position regression and motion-state classification. A multi-station signal model incorporating time-difference-of-arrival (TDOA) and Doppler shift is established, and ray-tracing pre-computed channels are adopted to emulate real-world maritime-aerial multipath scenarios. A hybrid network is designed to perform single-station convolutional feature extraction and cross-station Transformer-based spatiotemporal correlation modeling. Comprehensive simulations demonstrate the superiority of the proposed method in localization accuracy, noise robustness, modulation adaptability and computational efficiency. At -10 dB SNR, the proposed algorithm achieves an RMSE of 5.84 km, outperforming conventional maximum-likelihood DPD. It attains over 99% motion-state classification accuracy under high SNR, with a single-sample inference time of 10.6 ms, about $80\times$ faster than traditional approaches. The proposed algorithm balances high precision, strong robustness and high efficiency under complex electromagnetic environments.

Paper Title: Priority-Aware Skill Graph Scheduling for Multi-Skill Enterprise Communication Agents

Author(s): Liang Su, Mingchun Li

Presenter: Mingchun Li, China Telecom Digital Intelligence Technology Co., Ltd., China

**15:30-15:45
ET3281**

Abstract: Enterprise communication is undergoing an intelligent transformation where AI agents equipped with heterogeneous skills—call routing, conversation summarization, outbound reminders, digital human assistance, and data collaboration—must coordinate their execution under strict real-time constraints. We identify a fundamental scheduling challenge: skills in enterprise communication form implicit dependency chains that generic LLM-based tool orchestration frameworks fail to model, and urgent incoming-call tasks require preemptive interruption of lower-priority on-going executions. To address this, we propose the Priority-Aware Skill Graph Scheduling (PASGS) framework. PASGS



models enterprise communication skills as a Skill Dependency Graph (SDG)—a directed acyclic graph whose edges encode data and temporal dependencies—and solves the resulting DAG-constrained scheduling problem with two-priority preemption. We prove that under bounded service-time variability, the expected response time for high-priority reactive tasks satisfies $E[R_H] \leq E[C_H]/(1-\rho_H)$, guaranteeing deadline satisfaction when $\rho_H < 1$. We implement PASGS as the orchestration engine of Telbot, an enterprise communication AI agent deployed on a commercial cloud PBX platform. In a 30-day trial across 2,847 calls, PASGS achieves 91.3% intent routing accuracy, 0% dependency violations (vs. 12.4% for flat execution), and eliminates all deadline misses for reactive tasks—contributing to a 91.7% reduction in critical-call response time within the overall Telbot system.

ONLINE SESSIONS >>>

OS03: Aerial, Vehicular and Mobile Wireless Networks

Session Chair: Bo Li, Ningxia University, China

Time 16:10-18:40 | Oct. 18, 2026

Venue Room A
Zoom ID: 86863206117
Password: 101618

TALK DETAILS

Time	Presentation
16:10-16:25 ET1049	Paper Title: Freshness-Aware Preemptive Scheduling for UAV-Assisted Post-Disaster Networks Author(s): Yasmina Alaa, Mohamed Khedr, Angeles Vazquez Presenter: Yasmina Alaa Mohammed, Universitat Autònoma de Barcelona, Spain Abstract: In post-disaster communication networks, emergency information rapidly loses operational value as it becomes outdated. Under severe congestion, conventional UAV-assisted communication systems typically employ non-preemptive relay architectures where urgent and routine traffic compete equally for limited queue resources, causing time-sensitive emergency messages to experience excessive delays or packet loss. This paper proposes a freshness-aware preemptive scheduling framework for UAV-assisted post-disaster networks. The proposed scheduler jointly considers emergency urgency, residual battery level, wireless link quality, and Age of Information (AoI) to prioritize operationally relevant emergency traffic under queue saturation. When high-priority emergency packets arrive, lower-priority queued packets may be selectively replaced to preserve timely and actionable information delivery. Simulation results under severe congestion conditions show that the proposed framework increases Emergency Packet Delivery Ratio from 88.5% to 97.0% while reducing emergency drop rate from 11.4% to 3.0% compared with previous non-preemptive approaches. Results further demonstrate significant reductions in end-to-end delay and information staleness without increasing overall network throughput, showing that the gain arises from freshness-aware traffic differentiation rather than additional communication capacity.
16:25-16:40 ET1091	Paper Title: Resource Allocation for V2V Networks Based on Graph Mean Field Author(s): Yuchen Zhou, Si Liu, Mengmeng Ren, Mofan Luo, Bingtao He, Lu Lv Presenter: Si Liu, Xidian University, China Abstract: In vehicle-to-vehicle (V2V) communication networks, the spatial locality of V2V transmissions makes each link mainly affected by its geographically neighboring links rather than uniformly determined by all links in the network.



Meanwhile, high vehicle mobility causes the interference topology to continuously evolve over time. These characteristics lead to high computational overhead in global interference modeling, while conventional mean-field approximations have difficulty capturing heterogeneous local interactions. To address this, this paper proposes a graph mean-field hybrid interference modeling framework for base station-assisted V2V networks. By introducing a bounded-degree dynamic graph to model near field local interference and employing graph mean-field theory to approximate far-field interference, the proposed framework balances modeling accuracy and computational efficiency. Based on this framework, a graph-constrained multi-objective evolutionary algorithm based on decomposition (MOEA/D) is designed to maximize the energy efficiency of each V2V link by restricting evolutionary search within dynamic graph neighborhoods. Simulation results demonstrate that the proposed scheme achieves performance comparable to the exact global interference model while significantly reducing computational overhead.

Paper Title: Research on Automatic Identification Algorithm for Antenna Feeder Swap Based on AGPS MR Spatial Topology Probability Density

Author(s): Yingjie Ling, Haitao Quan

Presenter: Yingjie Ling, ZTE Corporation, China

**16:40-16:55
ET3316**

Abstract: In ultra-dense cellular mobile communication networks, physical topology misalignments within wireless antenna feeder architectures—commonly referred to as antenna feeder swaps—constitute critical physical-layer anomalies that induce widespread co-channel interference and abnormal E-RAB releases. To circumvent the inherent limitations of traditional manual drive tests (DT), which suffer from extensive spatial observation blind spots, degraded statistical robustness, and high susceptibility to complex environmental magnetic interference, this paper presents an automated identification paradigm driven by the spatial topological probability density of Assisted Global Positioning System Measurement Reports (AGPS-MR). This paper innovatively constructs a radio frequency (RF) geometric projection model featuring Earth's curvature error compensation. Concurrently, it introduces a spatial reliability weighting operator that dynamically couples Reference Signal Received Power (RSRP) and Reference Signal Received Quality (RSRQ), thereby eliminating the subjective constraints typical of manual diagnostics. Furthermore, the paper meticulously derives the probability density decision matrices and closed-loop decision logic for multi-order physical topological anomalies, including dual (AB) and cyclic (ABC) misconfigurations. Empirical evaluations within operational networks demonstrate that the proposed framework completely eradicates geographical blind zones. Compared to legacy DT methods, it achieves a comprehensive fault identification accuracy of 98.3%, restricts false positive rates to under 1.7%, and compresses the per-site detection latency from several days to mere hours. Field validations



**16:55-17:10
ET3353**

confirm that this mechanism substantially bolsters air-interface traffic and user-perceived throughput while precipitating a dramatic optimization in E-RAB drop rates, offering a highly rigorous, data-driven foundation for proactive physical-layer fault defense in Self-Organizing Networks (SON).

Paper Title: STPC-MambaVAE: Physics-Aware Mamba-Transformer-VAE for ADS-B Trajectory Anomaly Detection

Author(s): Zou Zhou

Presenter: Zou Zhou, University of Science and Technology of China, China

Abstract: Automatic dependent surveillance-broadcast (ADS-B) provides frequent aircraft-state reports but can contain trajectory inconsistencies caused by measurement error, coverage interruption, unusual motion, or deliberate manipulation. Reconstruction-only detectors may confuse rare yet feasible motion with anomalies, whereas fixed physical rules are difficult to tune across operating conditions. This paper presents STPC-MambaVAE, a physics-aware trajectory anomaly detector that combines selective state-space modeling, global attention, variational reconstruction, and kinematic-consistency scoring. Mamba models sequential state evolution, a Transformer encoder captures window-level interactions, and a variational bottleneck reconstructs normal trajectories. A physical branch applies the same speed, acceleration, heading-rate, and altitude-rate operators to observed and reconstructed windows and measures their disagreement. The final score fuses reconstruction, latent, and physical residuals, with the decision threshold selected only on validation data. Experiments on a public OpenSky-derived ADS-B benchmark and its processed model samples show 0.965 accuracy, 0.939 F1, 0.976 ROC-AUC, 0.963 average precision, 0.025 false-alarm rate, and 0.060 missed-detection rate. Compared with the closest Mamba-Transformer-VAE baseline, F1 improves by 0.024 and the missed-detection rate decreases by 0.031.

**17:10-17:25
ET3352**

Paper Title: Adaptive Beam Alignment for V2I Massive MIMO: A DRL-Driven Dynamic Hashing Scheme

Author(s): Mingheng Li, Yan Yang

Presenter: Mingheng Li, Beijing Jiaotong University, China

Abstract: With the large-scale deployment of Vehicle-to Infrastructure (V2I) networks, beam alignment for millimeter wave massive multiple-input multiple-output (MIMO) systems faces critical challenges. High vehicle mobility shortens beam coherence time, bringing an inherent tradeoff between pilot overhead and valid data transmission duration. Existing hash based beam training reduces overhead, yet fixed parameters lead to decoding failures from energy dispersion in low signal-to-noise ratio (SNR) environments and beam misalignment under intense vehicle movement. To solve these problems, we propose a dynamic beam alignment framework combining macro spatial truncation, micro hash training and



deep reinforcement learning (DRL). We build local subspaces from historical trajectories for physical layer dimensionality reduction, and adopt a random hash superposition codebook to cut probing overhead. The overhead robustness tradeoff is modeled as a Markov decision process (MDP) with physical constraints, where a deep Q-network (DQN) optimizes subspace window, hash layers and measurement numbers by sensing channel fading and trajectory errors. Simulations show the proposed method outperforms exhaustive sweeping and fixed hash schemes. It suppresses performance degradation in harsh high-mobility/low-SNR conditions, lowers pilot overhead while maintaining a high alignment success rate, and improves system effective throughput significantly.

Paper Title: A Two-Level Grouping and Column Generation Driven Group Handover Optimization Method for Large-Scale LEO Satellite Networks

Author(s): Mohan Dong, Tao Zhang

Presenter: Mohan Dong, Beihang University, China

17:25-17:40
ET3411

Abstract: The rapid motion of low Earth orbit (LEO) satellites causes frequent handovers, while limited satellite capacity creates competition among users. Per-user graph-based handover methods repeat graph construction and path search for users with similar coverage patterns. This paper proposes Group-based Satellite Switching with Column Generation (GSS-CG) for large-scale LEO satellite networks. Users are first divided into spatial groups based on geographical adjacency and coverage-fingerprint similarity, and then into service groups according to their service preferences. A common-visibility directed acyclic graph (DAG) is constructed for each spatial group, allowing its service groups to select shared service paths on the same graph. To coordinate path selection across service groups under global satellite-time capacity constraints, two-stage column generation first generates paths that reduce capacity conflicts and then improves service quality. Based on these candidate paths, hierarchical integer path selection selects one final service path for each service group while preserving service quality and reducing service-group-level handover decisions and user handover actions in sequence. In a simulation with 1600 satellites and 400 users, GSS-CG forms four spatial groups and 30 service groups. It reduces the number of handover decisions by at least 88.18% compared with four capacity-aware per-user methods and by 70.76% compared with the group-level decisions of BH-GHO. It also achieves the highest time-averaged service QoS and the lowest mean user-to-satellite slant range among all six methods, while satisfying all satellite capacity constraints.

17:40-17:55
ET4490

Paper Title: Development and Terrestrial Validation of a LoRa-Based Mesh Network Emergency Rescue and Real-Time Monitoring System for Small-Scale Fishing Vessels

Author(s): Franco Rafael R. Bautista, Franced Joshua G. Nidar, Marloun P. Sejera

Presenter: Franced Joshua G. Nidar, Mapua University, Philippines



Abstract: This paper presents the design, development, and terrestrial prototype validation of a LoRa-based mesh network for emergency rescue and real-time monitoring of small-scale fishing vessels. The system uses an ESP32-S3 as the processing unit, an SX1278 LoRa transceiver for multi-hop communication, a NEO-6M GPS module for location tracking, and a self-hosted web dashboard for shore-side monitoring. The prototype is intended for future deployment on traditional bangka boats; however, the experiments reported in this study were conducted as controlled terrestrial calibration tests rather than offshore maritime trials. A tactile button array classifies fire, medical, engine-failure, and sinking emergencies. Direct line-of-sight tests were conducted up to 3.0 km, while the multi-hop configuration was evaluated over a 2.0 km total end-to-end distance using an intermediate relay. One hundred packets were transmitted at each distance interval, and Packet Delivery Rate (PDR), Received Signal Strength Indicator (RSSI), Signal-to-Noise Ratio (SNR), and round-trip application latency were recorded. The GPS tests produced an average positioning error of 4.51 m. The direct-link baseline produced a mean PDR of 95.73% and declined to 92% at 3.0 km. The proposed multi-hop configuration produced a mean PDR of 96.15% across the tested relay-hop intervals, with 91% PDR at the maximum 1.0 km relay-hop condition and 79 ms latency. These results establish a terrestrial performance baseline for the proposed architecture. They do not, by themselves, establish performance under seawater reflection, vessel motion, wave blockage, or other offshore conditions.

Paper Title: Comparative Analysis of Spectral Temporal Averaging-Based Deep Learning Channel Estimation Approaches for IEEE 802.11p

Author(s): Saveeta Bai, Jeff Kilby, Krishnamachar Prasad

Presenter: Saveeta Bai, Auckland University of Technology, New Zealand

**17:55-18:10
ET3397**

Abstract: In high-mobility environments, channel estimation plays a critical role by compensating for rapid changes and keeping information up to date, specifically in vehicular networks such as Dedicated Short-Range Communications (DSRC). DSRC exhibits severe Doppler spread and has an insufficient number of pilot subcarriers in its frame structure. Comprehensive research has been undertaken on Spectral Temporal Averaging (STA)-based channel estimation. However, the performance of a typical STA scheme is suboptimal due to limited adaptability. This research presents a comparative analysis of STA-based deep learning channel estimation (DL-CE) in terms of accuracy (NMSE and BER against SNR) and computational complexity. Conventional schemes, such as LS and STA, and deep learning-based schemes (i.e., STA-DNN, STA-CNN, and STA-GRU) have been examined and analysed. The results show that the STA-GRU-based channel estimation technique is more effective than conventional LS and STA, as well as deep learning-based STA-DNN and STA-CNN, owing to its specific information-retention features.

18:10-18:25

Paper Title: Energy-Latency-Aware Cryptographic Core Selection for Secure

**ET2227****Wireless Edge Offloading**

Author(s): Xiuze Dong, Jiahui Liu, Kangfei Xiao, Cheng Zhao, Yiming Li, Zhao Wang, Maosheng He

Presenter: Jiahui Liu, Beijing Electronic Science and Technology Institute, China

Abstract: Wireless edge offloading reduces device-side computation burden and service latency, but protecting task data over wireless links introduces cryptographic latency and energy overhead. This paper presents an energy-latency-aware cryptographic core selection method for secure wireless edge offloading. AES-128, SKINNY-128-128, and uBlock-128 are implemented and profiled on the same FPGA platform to obtain cycles per block, throughput, dynamic power, and energy characteristics. The implementation-derived profiles are incorporated into a secure offloading model that includes encryption, wireless upload, edge execution, wireless download, and decryption. Under task deadline constraints, the proposed policy first identifies feasible cores and then selects the one minimizing a normalized latency-energy cost. Experimental results show that SKINNY reduces energy per bit by 88.94% compared with AES, while uBlock provides lower cryptographic latency. Compared with fixed-core baselines, the proposed method preserves deadline feasibility while exploiting energy-efficient cores under relaxed deadlines.

Paper Title: Terrain-Aware Optimal Deployment of UAV Swarm Relays for Energy-Efficient Wireless Networks

Author(s): Weihao Li, Chenyu Hu, Yu Wu, Mengji Shi, Boxian Lin

Presenter: Chenyu Hu, University of Electronic Science and Technology of China, China

Abstract: UAV swarm relay deployment in mountainous environments is challenged by terrain blockage, nonuniform user distributions, co-channel interference, and conflicting coverage and energy-efficiency objectives. To this end, this paper investigates terrain-aware three-dimensional UAV swarm deployment for mountainous wireless networks. A communication-oriented deployment model is established by jointly considering probabilistic line-of-sight propagation, terrain and spacing constraints, ground-vehicle support, interference, and transmit-power allocation. The resulting coverage-energy efficiency tradeoff is addressed using a weighted Escape Search (ESC) method and a Pareto-based multiobjective ESC framework. The latter eliminates manual weight selection through Pareto dominance, an external archive, and density-aware guide selection. Simulation results show that weighted ESC outperforms PSO, GWO, DBO, and SSA in aggregate deployment performance and energy efficiency while maintaining high coverage. The multiobjective method further achieves the highest mean hypervolume among seven benchmark algorithms and provides well-distributed tradeoff solutions. These results demonstrate its effectiveness for energy efficient UAV swarm relay deployment in terrain-constrained wireless networks.

18:25-18:40
ET3401



ONLINE SESSIONS



OS04: Communication Security, QoS and Green Networking

Session Chair: Lijun Zhang, E-surfing Vision Technology Co., Ltd, China Telecom

Time 16:00-18:30 | Oct. 18, 2026

Venue Room B
Zoom ID: 86890280564
Password: 101618

TALK DETAILS

Time

Presentation

**16:00-16:15
ET3275**

Paper Title: Multi-Link Operation Enabled QoS-Aware Service Scheduling for Subway Train-Ground Wi-Fi 7 Networks

Author(s): Gang Qing, Li Hao

Presenter: Gang Qing, Southwest Jiaotong University, China

Abstract: The train-ground communication system is critical for subway operations, yet legacy WLAN technologies cannot meet the increasing demand for high-throughput and low-latency services. Wi-Fi 7 Multi-Link Operation (MLO) enables simultaneous transmission across 2.4 GHz, 5 GHz, and 6 GHz bands. This paper proposes a QoS-aware MLO scheduling framework specifically designed for subway train-ground networks. To the best of our knowledge, this is the first work to systematically address MLO deployment in the unique subway environment with high mobility, tunnel propagation, and diverse service priorities. The proposed strategy dynamically allocates traffic across multiple links according to service priorities and realtime link quality, incorporating a tunnel-specific channel model and a four-level priority scheduling framework. Simulation results demonstrate that the proposed scheme achieves 2.45 Gbps throughput, outperforming traditional 5 GHz and round-robin scheduling by 175.8% and 151.9%, respectively, while reducing high-priority median latency to less than 1 ms. These results provide a practical framework for deploying Wi-Fi 7 MLO in urban rail transit systems.

Paper Title: MgBEV: Motion-Guided BEV Representation Learning for LiDAR-Based 3D Object Detection

Author(s): Maohong Liu, Weixi Zhou

Presenter: Maohong Liu, Sichuan Normal University, China

**16:15-16:30
ET3412**

Abstract: LiDAR-based 3D object detection has benefited greatly from Bird's-Eye View (BEV) representation learning. However, most BEV detectors mainly model the spatial structure of individual LiDAR scans, while temporal information is often introduced by aggregating historical features. Such aggregation does not explicitly describe how scene content changes over time. In this work, we present MgBEV, a motion-guided BEV representation learning framework for LiDAR-only 3D object



detection. MgBEV first extracts point-wise motion information from consecutive LiDAR observations and converts it into a Motion-aware BEV Prior. A Motion-guided BEV Transformer (MGBT) then uses the motion prior to interact with the current BEV representation before object decoding. In contrast to conventional temporal feature fusion, the auxiliary representation in MgBEV describes temporal motion rather than historical BEV appearance. We implement MgBEV on TransFusion-L and evaluate it on the nuScenes benchmark. Experimental results show consistent improvements over the baseline detector, while the additional BEV refinement module introduces only limited computational overhead.

**16:30-16:45
ET3356**

Paper Title: Intelligent Defense System Based on ML against Evolving DDoS Threat
Author(s): Ruofei Sun, Zakaria Alomari, Sun Xiaofan, Hemchand Sadineni
Presenter: Ruofei Sun, New York Institute of Technology, USA

Abstract: This paper presented an intelligent defense framework to enhance DDoS detection systems by ensemble ML model. The experimental results of training and evaluating metrics on the CICDDoS2019 dataset demonstrated both hybrid models achieved better performance compared with a single one. The soft voting combination of Support Vector Machine (SVM) and XGBoost achieved a maximum accuracy and recall of 0.9967. The stacking ensemble Random Forest (RF)+XGBoost delivered a precision performance of 0.9973. Finally, by using the OpenDaylight controller tested in real-time models in Mininet, the result showed autonomous threat mitigation. The study validated the ensemble learning effectively achieved the adaptable real-time DDoS detection in the dynamic cybersecurity environments.

**16:45-17:00
ET4481**

Paper Title: Zero-Forcing or MMSE, Which Is Better for the Gaussian Finite-State Markov Wiretap Channel with Delayed Feedback?
Author(s): Xiaoxiong Wen, Haoheng Yuan, Yingna Li, Bin Dai
Presenter: Xiaoxiong Wen, Kunming University of Science and Technology, China

Abstract: In the literature, it has been shown that the SK-type scheme asymptotically approaches the capacity of the Gaussian finite-state Markov wiretap channel with delayed feedback. In this paper, we show that in finite blocklength regime, this already existing scheme is not optimal. Specifically, the initialization coding stage of the original one adopts zero-forcing strategy, replacing this strategy by minimum mean square estimation (MMSE) strategy, and keeping other parts the same as those in the original scheme, we show that the finite blocklength performance of this modified scheme may be better, which also indicates in finite blocklength regime, the existing SK-type scheme may not be optimal.

**17:00-17:15
ET4515**

Paper Title: A CNN Acceleration Coprocessor with Posit-Based Processing Element
Author(s): Zhenjiao Chen, Jianmin Wei, Xinjun Zhou, Shiyu Peng, Fen Ge
Presenter: Xinjun Zhou, Nanjing University of Aeronautics and Astronautics, China



Abstract: To address the computation-intensive nature and structural diversity of Convolutional Neural Networks (CNNs), this paper proposes a configurable CNN acceleration coprocessor based on the RISC-V instruction set. The coprocessor features a configurable Posit-based processing element (PE) that supports multiple operation modes, including multiplication, addition, and activation. Multiple PEs are interconnected via the data switch bridge, forming an acceleration core with reconfigurable dataflow paths to dynamically adapt to various CNN architectures. Implemented and verified on the E203 SoC platform with a Xilinx FPGA, the coprocessor accelerates diverse CNN operations with modest resource overhead. The critical-path delay of the multiply-accumulate unit is 32.64 ns, outperforming prior designs. The standard convolution using 8-bit Posit achieves an $8.76 \times$ speedup over the standard instruction set. 16-bit Posit preserves FP32 inference accuracy across all four evaluated models.

Paper Title: Domain-Stable RF Fingerprint Identification via Class-Conditional Invertible Feature Translation

Author(s): Guomin Sun, Liu Yang, Zhiling Xiao

Presenter: Guomin Sun, University of Electronic Science and Technology of China, China

**17:15-17:30
ET3358**

Abstract: Radio frequency fingerprint identification (RFFI) exploits hardware-induced signal characteristics for physical layer authentication, but its performance often degrades when receiver hardware or channel conditions change. Existing domain generalization methods mainly reduce distribution discrepancies among observed domains, without explicitly modeling how the fingerprint representation varies across acquisition conditions. This limitation leads to inconsistent same-emitter representations across domains and weakens generalization to unseen conditions. To address this issue, a domain-stable RFFI framework is proposed that models cross-domain feature variation as an identity-preserving reversible translation process. Specifically, domain-specific class-conditional normalizing flows map RF features into a shared latent space, with their exact invertibility enabling bidirectional translation across source domains. To preserve emitter identity during translation, class-wise latent alignment is introduced to reduce cross-domain discrepancies in latent space. Classification and destination-domain center constraints are further imposed, enabling the translated features to maintain same-emitter consistency and inter-emitter separability throughout cross-domain transformation. Experiments on a real-world multi-domain RF dataset demonstrate that the proposed method outperforms the baseline methods in generalizing to unseen temporal, receiver, and location domains.

**17:30-17:45
ET3370**

Paper Title: Joint Beamforming for Integrated Sensing and Covert Communication against Distributed Wardens

Author(s): Qingyang Xu, Zhuo Sun, Ying Wang

Presenter: Qingyang Xu, Beijing University of Posts and Telecommunications, China



Abstract: Integrated Sensing and Communication (ISAC) can exploit sensing echoes to acquire the warden's channel state information (CSI), enabling joint beamforming where sensing signals simultaneously serve as cooperative artificial noise (AN) to conceal covert transmissions. However, in distributed warden scenarios, different warden locations lead to unequal detection capabilities. Specifically, closer wardens receive stronger signal power, forcing the transmitter to reduce transmit power and thus limiting the covert rate. To address this issue, we introduce a weighted leakage objective, where each leakage ratio characterizes the covert-signal-to-interference-plus-noise level at each warden, and the weighting factors assign higher priority to stronger wardens. In this way, sensing-induced AN is allocated differentially rather than uniformly across wardens. Based on this, we formulate a joint beamforming optimization problem subject to covertness, covert rate, sensing-accuracy, and transmit-power constraints. Numerical results demonstrate that the proposed scheme achieves a better rate-covertness trade-off than baseline schemes while guaranteeing the same covertness performance in distributed warden scenarios.

Paper Title: Fairness-Aware Cooperative Task Offloading and Resource Allocation for Age-Energy Efficiency Maximization in UAV-D2D-Assisted MEC Systems

Author(s): Jiahui Chen, Shie Wu, Hanchao Mu, Wenqing Wu, He Li

Presenter: Shie Wu, Yantai University, China; Wenqing Wu, Yantai University, China; He Li, Yantai University, China

**17:45-18:00
ET2226**

Abstract: Integrating unmanned aerial vehicles (UAVs) and device-to-device (D2D) communication for mobile edge computing (MEC) has emerged as a promising solution to alleviate network load and reduce reliance on edge servers. The age-energy efficiency (AEE) stands as a crucial metric to evaluate the information freshness and energy utilization performance. This paper formulates an AEE maximization problem in a UAV-D2D-assisted MEC system, in which a logarithmic utility function is incorporated to enhance fairness among ground devices (GDs). To tackle the problem, based on the deep deterministic policy gradient (DDPG) method, we propose a fairness-aware cooperative task offloading and resource allocation (FCORA) algorithm to jointly optimize task offloading, UAV trajectory, and GDs' transmit power. Simulation results demonstrate that the proposed algorithm achieves favorable AEE performance and improves fairness among GDs compared with benchmark schemes.

**18:00-18:15
ET2241**

Paper Title: Cycle-Aware VNF Placement for Heterogeneous Service Function Chains

Author(s): Baolin He, Jie Sun, Lianlian Zhang, Haoye Chai, Yong Li

Presenter: Baolin He, Nanjing University of Posts and Telecommunications, China

Abstract: Service Function Chain (SFC) deployment is commonly formulated for



linear service paths, while some security, media, and network-management services may repeatedly execute a subset of functions. This paper studies cyclic heterogeneous SFC deployment, where loop repetition amplifies forwarding delay. Co-locating loop Virtual Network Functions (VNFs) can reduce repeated inter-node propagation, but repeated local forwarding inside the loop still consumes vSwitch CPU resources. A Cyclic Heterogeneous SFC Deployment Optimization (CH-SFCDO) model is formulated to capture heterogeneous VNF demand, physical-path delay, loop-body co-location, and CPU feasibility. The problem is shown to be NP-hard through a reduction from the Quadratic Assignment Problem. Three cycle-aware heuristics are developed: Cycle-Aware Greedy (CAG), CAG-Enhanced (CAG-E), and Cycle-Aware Simulated Annealing (CASA). On Abilene cases, CASA achieves an average delay ratio of 1.037 to the exact reference, compared with 1.231, 1.212, and 1.553 for CAG, CAG-E, and the path-constrained SFCDO baseline, respectively. Results on Scale-Free and FatTree-16 topologies further indicate that the cycle-aware search can reduce delay under different network structures.

Paper Title: Grid-Safe Hierarchical Multi-Agent Reinforcement Learning for Computing-Electricity Coordination of Distributed Artificial Intelligence Data Centers

Author(s): Ding Lyu, Yiming Zhang, Chang Liu, Siyi Liao, Wenjun Hou and Dachun Ou

Presenter: Ding Lyu, China Unicom Shanghai Branch, China

**18:15-18:30
ET3320**

Abstract: Distributed artificial intelligence (AI) data centers offer spatiotemporal demand flexibility through deadline-aware workload scheduling, graphics processing unit (GPU) power control, and energy storage. However, exploiting this flexibility without considering distribution-network constraints may cause feeder congestion and unacceptable voltage deviations. This paper proposes GS-HMAPPO, a grid-safe hierarchical multi-agent reinforcement learning framework for multi-timescale computing--power coordination. An upper-level coordinator allocates hourly computing-capacity quotas, while distributed lower-level agents schedule task execution and battery operation at a finer timescale. A model-based optimal power flow projection maps learned actions onto state-dependent feasible sets, enforcing workload, storage, voltage, and line-capacity constraints whenever feasible solutions exist. In the model-consistent simulation environment, GS-HMAPPO reduces electricity cost, carbon emissions, and peak demand by up to 6.01%, 10.18%, and 27.24%, respectively. Ablation results further demonstrate the critical role of the safety layer in reliable and robust computing--power coordination.

ONLINE SESSIONS



OS05: Advances in Communication, Information, and Intelligent Networks

Session Chair: Huifang Chen, Zhejiang University, China

Time 16:00-18:30 | Oct. 18, 2026

Venue Room C
Zoom ID: 89148177352
Password: 101618

TALK DETAILS

Time	Presentation
16:00-16:15 ET4489	Paper Title: Robust Multi-Target ISAC Beamforming under Imperfect CSI Author(s): Xiaotan Li, Hui Shi, Weiwei Yang, Ying Huang, Youpeng Li, Liankun Jiang Presenter: Xiaotan Li, Army Engineering University of PLA, China Abstract: This paper investigates robust joint beamforming for multiuser, multi-target integrated sensing and communications (ISAC) systems under imperfect channel state information (CSI). Norm-bounded CSI uncertainty is considered to ensure worst-case signal-to-interference-plus-noise ratio (SINR) requirements. Two sensing objectives are studied: weighted-sum sensing-gain maximization for target-priority-aware design and max-min sensing-gain maximization for fairness-oriented design. Using covariance lifting and the S-procedure, the robust SINR constraints are transformed into finite-dimensional linear matrix inequalities. After relaxing the rank-one constraints, the resulting problems are formulated as convex semidefinite programs (SDPs), whose optimal values provide upper bounds on the original beamforming problems. Rank-one communication beamformers are subsequently recovered and verified against the original robust SINR and power constraints. In addition, a successive convex approximation (SCA) method is developed to directly optimize the beamformers, with each iteration formulated as a second-order cone program (SOCP). The proposed framework offers complementary approaches for balancing reliable multiuser communications and robust multi-target sensing under imperfect CSI.
16:15-16:30 ET3372	Paper Title: Real- and Virtual-Part Mapping-Based Vulnerable-Bit Protection for LDPC-Zipper Codes over the BEC Author(s): Yong Zhao, Mengyao Li, Lijun Zhang Presenter: Yong Zhao, Beijing Jiaotong University, China Abstract: This paper investigates two vulnerable-bit protection schemes for LDPC-Zipper codes over the binary erasure channel (BEC). A systematic LDPC component code is employed, and residual-erasure statistics are used to identify positions for targeted protection. The real-part scheme additionally transmits the 20 most vulnerable bits. To avoid the associated rate loss, the virtual-part scheme



interleaves the 40 most vulnerable positions, splits them into two groups, and maps them to rows i plus 1 and i plus 2. The adaptive sliding-window decoder is adopted as the common decoding framework. At a bit error rate of 0.00001, the two schemes provide erasure-probability gains of about 0.019 and 0.031, corresponding to improvements of about 13 percent and 24 percent, respectively. At approximately equal code rates, the virtual-part scheme provides a further erasure-probability gain of about 0.008, corresponding to an improvement of about 5 percent.

**16:30-16:45
ET1057**

Paper Title: Schottky Diode-Based D-Band Subharmonic Mixer for Radiometer Applications

Author(s): WanChao Zhang, Ran Chu, Linlin Sun, Jia Liao

Presenter: WanChao Zhang, Nanjing University of Science and Technology, China

Abstract: This paper presents a Schottky-diode-based D-band subharmonic mixer for radiometer down-conversion. To address strong parasitic effects, aggravated nonlinearity, and significant transmission loss at D-band frequencies, an anti-parallel diode-pair topology is adopted together with suspended microstrip lines and a low-loss 50 μm thin quartz substrate. A co-design flow combining 3D electromagnetic modeling and SPICE nonlinear circuit simulation is used to extract and incorporate parasitic parameters for improved model fidelity. A reduced-height waveguide transition is introduced to improve waveguide-to-microstrip coupling efficiency, and a compact resonant-cell filter is employed to reduce circuit size. Measured results show that at 5 dBm LO input power, the conversion loss ranges from 8.5 dB to 13.5 dB over 130–170 GHz.

**16:45-17:00
ET3325**

Paper Title: Time-Conditioned Attention Deep Reinforcement Learning for Robust RSU Beam Scheduling in Urban VANETs

Author(s): Xianjing Wu, Junyuan Zhao, Decheng Ding, Ruizhe Huang, Junbin Chen, Chuliang Wei

Presenter: Junyuan Zhao, Shantou University, China

Abstract: Dynamic beam scheduling for roadside units (RSUs) in urban vehicular ad hoc networks (VANETs) must balance coverage quality and online decision latency under rapidly varying traffic. We propose a Time-Conditioned Attention Deep Reinforcement Learning (TCA-DRL) framework for dynamic three-beam scheduling under a strict causal evaluation protocol. The problem is formulated as a constraint-aware Markov decision process with a MultiDiscrete differential action mapping that enforces beam-center separation by construction. A time-conditioned attention policy combines temporal gating of multi-scale polar traffic features with cross-attention over raw vehicle bearings, enabling adaptation to directional hot spots that evolve over time. Proximal Policy Optimization (PPO), greedy search, and simulated annealing (SA) are evaluated under the same causal



observation budget and chronological train/validation/test split. Experiments on 24-hour real-world Global Positioning System (GPS) traces across four urban RSU scenarios show that TCA-DRL achieves strong strict-slot performance and worst-slot robustness, competitive weighted coverage, and substantially lower inference latency than SA, supporting its use for real-time RSU beam control.

Paper Title: Design of a Phase-Shifting Network-Based Improved Broadband Asymmetric Doherty Power Amplifier

Author(s): Chen Yang Bai, Ran Chu, Linlin Sun, Jia Liao

Presenter: Chen Yang Bai, Nanjing University of Science and Technology, China

17:00-17:15
ET1079

Abstract: This paper presents an in-depth analysis of the advantages and disadvantages of the conventional Doherty power amplifier (DPA). To effectively alleviate the inherent trade-off between bandwidth extension and efficiency enhancement, an improved broadband asymmetric Doherty power amplifier circuit based on a phase-shift network is proposed. High back-off efficiency is achieved by means of an asymmetric Doherty power amplifier (DPA) architecture. The conventional quarter-wavelength impedance transformer is discarded, and the parasitic parameters of the transistor are incorporated into the matching network, thereby extending the operational bandwidth of the amplifier. The load impedances at both the back-off point and the saturation point are determined through calculation, and a gradient optimization algorithm is employed to ensure high efficiency at these two points. Furthermore, a T-type linear phase-shifting network is introduced to achieve phase alignment of the currents at the combining node, enabling the asymmetric Doherty power amplifier to maintain high efficiency over a wide bandwidth. A high-back-off, high-efficiency Doherty power amplifier (DPA) operating from 1.4 to 2.1 GHz is designed. Experimental measurements demonstrate that within the operational bandwidth, the saturated output power ranges from 43.4 to 44.3 dBm, the drain efficiency at saturation ranges from 67% to 70%, the efficiency at 6-dB power back-off ranges from 51% to 59%, and the efficiency at 9-dB power back-off ranges from 51% to 54%. These results successfully achieve the objective of high back-off and high efficiency.

Paper Title: CMV-Open: Multi-View Supervised Contrastive Learning for Open-Set Network Intrusion Detection

Author(s): Anhao Zhu, Zhenhua Ling, Zhengpeng Zha

Presenter: Anhao Zhu, University of Science and Technology of China, China

17:15-17:30
ET3350

Abstract: Attack types and communication behaviors continue to evolve in open environments, causing test traffic to contain classes that are absent during training. Open-set network intrusion detection must therefore classify known traffic correctly while rejecting unseen classes as unknown. Existing methods commonly derive unknown scores from classification confidence, activation calibration, reconstruction error, or



feature distance. However, a single input granularity cannot simultaneously preserve packet content and flow-level behavior, while representations learned with cross-entropy alone need not form local structures suitable for distance-based rejection. This paper presents CMV-Open (Multi-View Supervised Contrastive Learning for Open-Set Network Intrusion Detection), which jointly models two complementary views, Packet and Flow. The Packet view encodes packet bytes and packet-level metadata, whereas the Flow view uses a flow-statistics token and a burst-sequence token to characterize global statistical distributions and consecutive same direction transmission patterns. Bidirectional cross-attention constructs a unified multi-view traffic embedding. During training, supervised contrastive learning is combined with cosine-margin classification, prototype compactness, and inter-class separation losses to constrain the known-class embedding distribution. Interclass embedding interpolation is further used to construct a pseudo-unknown regularizer that suppresses excessive confidence in transition regions between known classes. At inference, a class-conditional k-nearest-neighbor distance measures the deviation of a sample from the local neighborhood of its predicted class, and rejection thresholds are calibrated using known validation data only. Comparative and ablation experiments on USTC-TFC2016 and CIC-IDS2017 show that CMV-Open achieves a favorable balance between correct known-class classification and unknown-class rejection. The results support the complementary roles of Packet – Flow information and supervised contrastive learning at the input-representation and training-objective levels, respectively.

Paper Title: Design of an X-Band High-Isolation Probe-Coupled Eight-Way Radial Power Combiner

Author(s): Zihao Chen, Ran Chu, Linlin Sun, Jia Liao

Presenter: Zihao Chen, Nanjing University of Science and Technology, China

17:30-17:45
ET1062

Abstract: Based on a novel structure combining a microstrip isolation circuit and coaxial interfaces, this paper designs an X band high-isolation eight-way radial power combining network. Firstly, an improved radial Wilkinson microstrip isolation circuit is proposed. Integrating the microstrip isolation circuit with the radial cavity effectively achieves wide bandwidth, high isolation, and high power capacity. Adopting a side-fed microstrip structure to replace the vertical coaxial input significantly reduces the vertical space requirement of the radial power combiner while enhancing the mechanical stability of the device. Subsequently, a fully-wrapped polytetrafluoroethylene (PTFE) support structure is innovatively employed to replace the traditional stepped structure, which effectively improves assembly stability. The designed and implemented power combiner achieves an input return loss greater than 15 dB, an insertion loss of less than 1 dB, and an isolation higher than 15 dB over the frequency range of 9.7 to 10.4 GHz. The combining



**17:45-18:00
ET1059**

efficiency is between 80% and 86%. The overall device size is 69 mm × 69 mm × 24 mm, exhibiting high isolation, high power-handling capability, high combining efficiency, vertical compactness, and excellent mechanical stability.

Paper Title: Multilayer SIW Wide-Stopband Filter with Multimode Suppression

Author(s): Junyuan Shen, Linlin Sun, Ran Chu, Jia Liao

Presenter: Junyuan Shen, Nanjing University of Science and Technology, China

Abstract: To address insufficient higher-order mode suppression and limited stopband extension in single-layer substrate integrated waveguide (SIW) filters, this paper proposes a multilayer wide-stopband substrate integrated waveguide bandpass filter based on multimode cooperative suppression. Orthogonal feeding is employed to suppress higher-order modes near the dominant mode. TE-mode coupling cancellation is achieved by optimizing the semicircular coupling windows between multilayer SIW cavities. In addition, controllable transmission zeros are introduced by etching defected ground structures on the input layer. These techniques jointly suppress higher-order modes and realize wide-stopband performance. The fabricated filter exhibits a measured center frequency of 3.65 GHz and a 3-dB bandwidth of 100 MHz, corresponding to a fractional bandwidth of 2.74%. The measured $|S_{21}|$ remains below -22 dB up to 15.5 GHz, corresponding to a normalized stopband of approximately 4.25f₀. The stopband rejection near the passband is better than 50 dB, demonstrating high selectivity and wide-stopband performance. The proposed filter exhibits high selectivity and wide-stopband performance.

**18:00-18:15
ET3384**

Paper Title: Predictive QoS-Aware Resource Scheduling for Multi-Slice RANs via LSTM and SAC

Author(s): Yizhou Wang, Longqian Huang, Hongguang Sun

Presenter: Yizhou Wang, Northwest A&F University, China

Abstract: Providing heterogeneous quality-of-service (QoS) in multi-slice Radio Access Networks (RANs) is severely challenged by user mobility and bursty traffic dynamics. Conventional reactive schedulers often struggle to adapt to these rapid temporal variations, leading to immediate QoS degradation. To address this limitation, this paper proposes a predictive QoS-aware scheduling framework that synergistically integrates Long Short-Term Memory (LSTM) networks with Soft Actor-Critic (SAC) reinforcement learning. Specifically, the LSTM module forecasts short-term user trajectories and traffic demands to augment the observation space, enabling the SAC agent to execute anticipatory resource allocation and reservation. Furthermore, a slice-aware reward function is designed to balance throughput, reliability, and fairness across distinct network slices. Extensive simulations using the realistic QuaDRiGa channel model demonstrate that the proposed LSTM-SAC approach significantly outperforms representative baselines. Notably, it substantially enhances the 5th-percentile tail throughput for best-effort



(BE) slices while guaranteeing near-zero latency and strict packet loss requirements for ultra-reliable low-latency communications (URLLC).

Paper Title: Two-Timescale Optimization for RIS-Assisted Uplink NOMA Networks with Statistical CSI-Based RIS Configuration

Author(s): Yuting Jiang, Changqing Ye, Yi Lu, Jingwei Chen, Chongjun Huang, Zhiqiang Yu

Presenter: Yuting Jiang, Xichang University, China

**18:15-18:30
ET4441**

Abstract: The practical implementation of reconfigurable intelligent surfaces (RISs) is constrained by the overhead associated with instantaneous CSI acquisition and frequent RIS phase adjustments. In this paper, we investigate a two-timescale optimization framework for RIS-assisted uplink non-orthogonal multiple access (NOMA) networks. The RIS phase configuration is optimized offline using statistical CSI and kept fixed during online transmission, where user transmit powers are adapted according to instantaneous CSI. An element-wise alternating optimization (AO) algorithm is adopted for offline RIS configuration, and an SCA-inspired iterative method is employed for online power allocation. Numerical results verify that the proposed framework outperforms benchmark schemes in terms of achievable sum rate while reducing RIS reconfiguration overhead. The proposed design provides a low-overhead optimization solution for RIS-assisted uplink NOMA systems.

◆ Sponsored by



暨南大學
JINAN UNIVERSITY

IEEE China Council
中国联合会



◆ Hosted by



暨南大學
JINAN UNIVERSITY



澳門大學
UNIVERSIDADE DE MACAU
UNIVERSITY OF MACAU

◆ Patrons



北京郵電大學
Beihang University of Posts and Telecommunications



香港科技大学(广州)
THE HONG KONG
UNIVERSITY OF SCIENCE AND
TECHNOLOGY (GUANGZHOU)



東南大學
SOUTHEAST UNIVERSITY



电子科技大学
University of Electronic Science and Technology of China



西安电子科技大学
XIDIAN UNIVERSITY



先进通信网全国重点实验室
National Key Laboratory of Advanced Communication Network Technology



Digital
Communications and
Networks

