Proposal for IEEE Globecom 2024 Workshop (Full-day), Cape Town, South Africa

IEEE Globecom Workshop on Ubiquitous Network Intelligence for Next Generation Wireless Networks

(Tentative Date: Dec. 8, 2024)

I: Scope and Topics of the Workshop

The next generation wireless networks (NGWNs) are expected to support increasingly heterogeneous networking paradigms, adapt to dynamic network environments, and provide diversified intelligent services with stringent quality of service (QoS) requirements. To this end, artificial intelligence (AI) will penetrate and be integrated into every facet of the network, including end users, network edge, and the cloud, resulting in the ubiquitous network intelligence. The ubiquitous network intelligence can be enabled from two perspectives: AI for networking and networking for AI. The former is to leverage and customize AI-based methods for complex network management in NGWNs, while the latter is to design and optimize NGWNs to facilitate service-oriented AI applications (i.e., AI services). However, realizing ubiquitous network intelligence confronts different challenges. It should support various AI services with distinct QoS requirements in terms of latency, reliability, accuracy, etc. In addition, the service demands exhibit spatial and temporal dynamics due to traffic burstiness and user mobility. It is of paramount importance to improve the utilization of heterogeneous sensing, communication, computing, storage, and control resources for determining fine-grained user-centric networking solutions.

The objective of this workshop is to promote the harvest of the benefits of ubiquitous network intelligence for NGWNs by considering the challenges. This workshop can serve as a forum for researchers from academia, government, and industries, to exchange ideas, present new results, and provide future visions on these topics. Topics of interest include but are not limited to:

- Performance analysis of ubiquitous network intelligence
- Large language model applications in NGWNs
- Architecture and protocol design for NGWNs
- SDN and resource virtualization for NGWNs
- Intelligent network slicing for NGWNs
- AI service provisioning in NGWNs
- Intelligent coordination among end, edge and cloud
- Green network intelligence in NGWNs
- Security and privacy in ubiquitous network intelligence
- Federated learning and split learning for NGWNs
- Data analytics and learning enabled NGWNs
- Task offloading for intelligent applications
- Cooperative AI model training and inference
- Data collection for ubiquitous network intelligence
- Mobile edge computing/caching for NGWNs
- AI-based network management for NGWNs
- Digital twin assisted NGWNs
- Intelligent user-centric network management

II: Workshop Organizers

Workshop General Co-chairs

Ning Zhang, University of Windsor, Canada (ning.zhang@uwindsor.ca)
Tom H. Luan, Xi'an Jiaotong University, China (tom.luan@xjtu.edu.cn)

Workshop TPC Co-chairs

Wen Wu, Peng Cheng Laboratory, China (wuw02@pcl.ac.cn)
Katsuya Suto, University of Electro-Communications, Japan (k.suto@uec.ac.jp)
Omar Alhussein, Khalifa University, UAE (omar.alhussein@ku.ac.ae)
Yujie Tang, Dalhousie University, Canada (yujie.tang@dal.ca)
Meng Qin, Peng Cheng Laboratory, China (qinm01@pcl.ac.cn)

Workshop Publicity Co-chairs

Qihao Li, Jilin University, China (qihaol@jlu.edu.cn)
Kaige Qu, University of Waterloo, Canada (k2qu@uwaterloo.ca)

Invited Keynote Speakers

Yu Cheng, Illinois Institute of Technology, USA
Takayuki Nishio, Tokyo Institute of Technology, Japan

III: Biographies of Workshop Organizers

Ning Zhang is an Associate Professor and Canada Research Chair in the Department of Electrical and Computer Engineering at University of Windsor. He received the Ph.D. degree in Electrical and Computer Engineering in Jan. 2015, from University of Waterloo, Canada. After that, he was a postdoc research fellow at the University of Waterloo and University of Toronto, respectively. His research interests include connected vehicles, mobile edge computing, wireless networking, and security. He is a Distinguished Lecturer of IEEE ComSoc and a Highly Cited Researcher (Web of Science). He serves/served as an Associate Editor of IEEE Transactions on Mobile Computing, IEEE Communications Surveys and Tutorials, IEEE Internet of Things Journal, and IEEE Transactions on Cognitive Communications and Networking. He also serves/served as a TPC/General chair for numerous conferences. He received several Best Paper Awards from conferences and journals, such as IEEE Globecom, IEEE ICC, IEEE ICCC, IEEE WCSP, and Journal of Communications and Information Networks. He serves as the Vice Chair for IEEE Technical Committee on Cognitive Networks and IEEE Technical Committee on Big Data.

Tom H. Luan is a Full Professor with the School of Cyber Science and Engineering, Xi'an Jiaotong University, China. He received the B.Eng. degree from Xi'an Jiaotong University, Xi'an, China, in 2004, the M.Phil. degree from The Hong Kong University of Science and Technology, Hong Kong, in 2007, and the Ph.D. degree from the University of Waterloo, Waterloo, ON, Canada, in 2012. He has authored/co-authored more than 200 technical papers in journals and conference proceedings, and has received one U.S. patent. His research mainly focuses on content distribution and media streaming in vehicular ad hoc networks and peer-to-peer networking, and the protocol design and performance evaluation of wireless cloud computing and edge computing. Dr. Luan served the TPC chair of EAI CPScom'2021, EAI Tridentcom'2021 and symposium chairs of ICNC 2014, 2015.

Wen Wu is an Associate Researcher at the Frontier Research Center, Peng Cheng Laboratory, Shenzhen, China. He received the Ph.D. degree in Electrical and Computer Engineering from University of Waterloo, Waterloo, ON, Canada, in 2019. He worked as a Post-doctoral Fellow with the Department of Electrical and Computer Engineering, University of Waterloo. He has authored/co-authored more than 90 journal and conference papers and has received two PCT patents. His research interests include 6G networks, network intelligence, and network virtualization. Dr. Wu received the World Top 2% Scientist Award, IEEE HITC Award for Excellence (Early Career Researcher), and IEEE CIC/ICCC Best Paper Award. He serves/served as an Editor/Guest Editor of Springer PPNA, Hindawi WCMC, China Communications, and Electronics. He also serves/served as a Track/Symposium Chair of IEEE VTC-Fall'23/24, IEEE Future Networks World Forum'24, EAI CollaborateCom'2021, and a TPC Co-Chair for several international workshops, including IEEE INFOCOM'22/23/24, IEEE ICCC'23, IEEE IPCCC'21 and HPCC'21. He is a Senior member of IEEE.

Katsuya Suto is an Associate Professor with the Graduate School of Informatics and Engineering, the University of Electro-Communications, Tokyo, Japan. He received the B.Sc. degree in computer engineering from Iwate University, Morioka, Japan, in 2011, and the M.Sc. and Ph.D. degrees in information science from Tohoku University, Sendai, Japan, in 2013 and 2016, respectively. He has worked as a Postdoctoral Fellow for Research Abroad, Japan Society for the Promotion of Science, in the Broadband Communications Research Lab., University of Waterloo, ON, Canada, from 2016 to 2018. His research interests include semantic communications, radio propagation, deep learning, and graph representation. He received the Best Paper Award at the IEEE VTC 2013-Spring, the IEEE/CIC ICCC 2015, the IEEE ICC 2016, and the IEEE Transactions on Computers in 2018. He serves/served as an Associate Editor/Guest Editor of IJCA, IEEE TVT, Springer PPNA, and IJDSN. He also serves/served as a Publicity Co-Chair for IEEE INFOCOM'22/23/24 and a TPC Co-Chair for IEEE/CIC ICCC'23. He is a member of IEEE and IEICE.

Omar Alhussein is an Assistant Professor with the Computer Science Department at Khalifa University, United Arab Emirates. He received his Ph.D. in Electrical and Computer Engineering from the University of Waterloo, Canada, in 2020, his M.A.Sc. degree in Engineering Science from Simon Fraser University, Canada, in 2015, and his B.Sc. degree from Khalifa University, United Arab Emirates, in 2013. Prior to joining Khalifa University, Dr. Alhussein worked as a Senior Research Engineer with the Advanced Networking Team at Huawei Technologies Canada in Ottawa, from 2020 to 2023. With high-impact publications and award-winning patent applications, Dr. Alhussein has made impactful contributions to the fields of networking and AI. His research interests include network automation, network resource management and optimization, AI and networking, and wireless networks. He has received numerous awards during his industrial position with Huawei Technologies, such as an outstanding individual award and a quality research award. He serves as an Associate Editor for Springer PPNA.

Yujie Tang is an Assistant Professor with the Faculty of Computer Science at Dalhousie University, Halifax, NS. Before joining Dalhousie, she was an Assistant Professor with the School of Computer Science and Technology at Algoma University, Sault Ste. Marie, ON. She held a postdoctoral fellowship at the Department of Electrical and Computer Engineering at the University of Waterloo, Waterloo, ON, where she earned her Ph.D. degree in Electrical and Computer Engineering from the same institution. Her research interests span various domains, including Internet of Vehicles, Unmanned Aerial Vehicles, Space-Air-Ground-Sea

integrated networks, resource management in heterogeneous networks, machine learning, cooperative networking, and cognitive radio networks. She is a member of IEEE, IEEE ComSoc, IEEE VTS, and IEEE ITSC. She currently serves on the AdHoc committee of IEEE VTS SAGW. Furthermore, she has contributed to the technical committees of numerous prestigious conferences in networking such as IEEE INFOCOM, GLOBECOM, ICC, and VTC.

Meng Qin is an Assistant Researcher at the Frontier Research Center, Peng Cheng Laboratory, Shenzhen, China. He received the B.S. degree in communication engineering from the Taiyuan University of Technology, Taiyuan, China, in 2012, and the M.S. and Ph.D. degrees in information and communication systems from Xidian University, Xi'an, China, in 2015 and 2018, respectively. He worked as a Postdoctoral Fellow with Pengcheng Laboratory and Peking University, Shenzhen, China.
He has authored/coauthored more than 30 journal and international conference papers. His research interests include cloud native network, AI-aided self-organized wireless networks, edge intelligence in wireless networks, and green cloud storage. He served as the TPC members for IEEE ICCC'22, IEEE IPCCC'23, IEEE ICC'23, IEEE ICC'24, IEEE INFOCOM'24, IEEE PRIMC'24.

Qihao Li is an Associate Professor with the College of Communication Engineering, Jilin University, China. He received the M.Sc. degree in Information and Communication Technology from University of Agder, Norway, in 2013 and Ph.D. degree in the Department of Electrical and Computer Engineering from the University of Oslo, Norway, in 2019. In 2016, he was a visiting researcher at the Department of Electrical and Computer Engineering, University of Waterloo, Waterloo, ON, Canada. In 2020, he was a postdoctoral fellow with the Department of Electrical and Computer Engineering from University of Waterloo, ON, Canada. His current research focuses on industrial Internet, digital twin, optimal control and optimization, wireless network security and localization. He served as the TPC Chair for IEEE CIC/ICCC'23/24, and members of TPC for IEEE Globecom'19-24, IEEE ICC'19-24, IEEE CIC ICCC'17-24, EuCAP'2019, BDEC-SmartCity'18.

Kaige Qu is a Research Associate with the Department of Electrical and Computer Engineering, University of Waterloo, Canada. She received the Ph.D. degree in electrical and computer engineering from the University of Waterloo, Waterloo, ON, Canada, in 2021. She received the B.Sc. degree in communication engineering from Shandong University, China, in 2013, and M.Sc. degrees in integrated circuits engineering and electrical engineering from Tsinghua University, Beijing, China, and KU Leuven, Leuven, Belgium, respectively, in 2016. Her research interests include connected and autonomous vehicles, network intelligence, network virtualization, and digital twin assisted network automation. She served as a Publicity Co-Chair for IEEE INFOCOM'22 on Pervasive Network Intelligence for 6G Networks, and a Co-Chair for IEEE ICUS'23 Invited Session.

IV: Rationale

1. Why is the topic timeless and important?

With the global roll-out of 5G networks, people are envisioning NGWNs, i.e., 6G networks. In NGWNs, AI is highly expected to play a pivotal role in network management and service provisioning. So far, both NGWNs and AI are extremely hot and important topics in the areas of networking, which have been attracting great attention from both academia and industry. Many vision-oriented and technical papers are expected to emerge in the coming future.

2. Describe the difference between the proposed workshop and the main conference symposium.

There are some symposiums on AI techniques in the main conference, such as the "Cognitive radio and AI-enabled networks" symposium and "machine learning for wireless networks" SAC. Different from these symposiums, our workshop focuses on the integration of AI and networking in future 6G networks, which includes two aspects. One is AI for networking in NGWNs, i.e., how to leverage and customize AI-based methods for complex network management in NGWNs. The first aspect requires customized AI method design for emerging and challenging network management problems. Secondly, the other is networking for AI, which emphasizes designing and optimizing networks for supporting AI services. The second aspect is seldom mentioned in the symposiums in the main conference.

3. Why may the workshop attract a significant number of submissions of good quality?

- **Global efforts are accelerating the advancement of NGWNs and AI technologies.** Government institutions all over the world, such as the USA, UK, Japan, Korea, and China, have launched multiple NGWN research projects. The industry has invested a large amount of money in exploring potential key technologies of 6G. Moreover, a large number of world-renowned researchers and their research groups are studying NGWNs and state-of-the-art AI technologies for NGWNs. With these efforts, the research on NGWNs and AI have gained momentum recently. As such, the workshop on NGWNs and network intelligence organized in conjunction with such top-rank conference in the field of wireless communications, will unquestionably attract a significant number of high-quality paper submissions.
- **Considerable experience in conference and workshop organization.** The workshop co-chairs have successfully organized related workshops/special sessions for top-tier conferences, e.g., IEEE ICC'22 (Ning Zhang), IEEE INFOCOM'22/23/24 (Wen Wu, Ning Zhang, Katsuya Suto, Kaige Qu), IEEE ICCC'23/24 (Wen Wu, Ning Zhang,

Katsuya Suto, Qihao Li), IEEE VTC-Fall'20/21/22/23/24 (Wen Wu, Ning Zhang, Tom H. Luan), ACM MobiCom' 22 (Ning Zhang), IEEE IPCCC'21 (Wen Wu, Ning Zhang), BSC'23 (Ning Zhang), IEEE IWCMC'2021 (Ning Zhang), IEEE HPCC'21 (Wen Wu). Furthermore, the workshop organizers would like to extend the proposed workshop into a workshop series in IEEE Globecom.

- **Considerable experience as regular editors in top-tier journals**. Ning Zhang is currently serving as the Associate Editor of IEEE TMC/COMST/IOTJ/TCCN. Wen Wu and Omar Alhussein are currently serving as Associate Editors in Springer PPNA. Katsuya Suto served as Associate Editor/Guest Editor of IJCA, IEEE TVT, Springer PPNA, and IJDSN. The workshop organizers serve on Editorial Board on a number of journal papers and have extensive editing experience.

V: Participants

1. Accepted Keynote Speakers

Yu Cheng (IEEE Fellow) is a Full Professor with the Department of Electrical and Computer Engineering, Illinois Institute of Technology, Chicago, IL, USA. His research interests include wireless network performance analysis, information freshness, machine learning, network security, and cloud computing. He was the recipient of Best Paper Award at QShine 2007, IEEE ICC 2011, and a Runner-Up Best Paper Award at ACM MobiHoc 2014, National Science Foundation (NSF) CAREER Award in 2011 and IIT Sigma Xi Research Award in the junior faculty division in 2013. He has served as several Symposium Co-Chairs for IEEE ICC and IEEE GLOBECOM, and Technical Program Committee (TPC) Co-Chair for IEEE/CIC ICCC 2015, ICNC 2015, and WASA 2011. He was a founding Vice Chair of the IEEE ComSoc Technical Subcommittee on Green Communications and Computing. He was an IEEE ComSoc Distinguished Lecturer in 2016–2017. He is an Associate Editor for IEEE Transactions on Vehicular Technology, IEEE Internet of Things Journal, and IEEE Wireless Communications.

Takayuki Nishio is an Associate Professor with the School of Engineering, Tokyo Institute of Technology, Japan. He received the B.E. degree in electrical and electronic engineering and the master's and Ph.D. degrees in informatics from Kyoto University, Japan, in 2010, 2012, and 2013, respectively. From 2013 to 2020, he was an Assistant Professor with the Graduate School of Informatics, Kyoto University. From 2016 to 2017, he was a Visiting Researcher with the Wireless Information Network Laboratory (WINLAB), Rutgers University, USA. His current research interests include machine learning-based network control, machine learning in wireless networks, and heterogeneous resource management.

2. Technical Program Committee Members (Tentative)

Lian Zhao, Toronto Metropolitan University, Canada	Amr Salaheldin Hashem Matar, Huawei Canada, Canada
Khalid Aldubaikhy, Qassim University, Saudi Arabia	Weisen Shi, Huawei Canada, Canada
Sanaa Taha, Cairo University, Egypt	Katsuya Suto, University of Electro-Communications, Japan
Nizar H Alsharif, Al Baha University, Saudi Arabia	Tao Han, New Jersey Institute of Technology, USA
Haixia Peng, Xian Jiaotong University, China	Takayuki Nishio, Tokyo Institute of Technology, Japan
Mushu Li, Toronto Metropolitan University, Canada	Omar Alhussein, Khalifa University, UAE
Zubair Fadlullah, University of Western Ontario, Canada	Hai Jiang, Alberta University, Canada
Conghao Zhou, University of Waterloo, Canada	Ming Ding, Data61, Australia
Huaqing Wu, University of Calgary, Canada	Dinh Thai Hoang, University of Technology Sydney, Australia
Ruozhou Yu, North Carolina State University, USA	Peng Yang, Huazhong University of Technology, China
Miao Wang, North Carolina State University, USA	Fang Fang, University of Western Ontario, Canada
Qiang Ye, University of Calgary, Canada	Mohamed M. E. A. Mahmoud, Tennessee Tech. University, USA
Zhi Liu, University of Electro-Communications, Japan	Shengbo Liu, Peng Chang Laboratory, China
Nan Cheng, Xidian University, China	
Shaofeng Li, Peng Cheng Laboratory, China	

VI: Planned Format of the Workshop

The workshop is organized as a **full-day** program.

- This workshop will employ a **hybrid** format consisting of both oral presentations and poster sessions. All the submissions will be rigorously scored. Higher-scoring works presented orally and those with relatively slight lower scores displayed as posters. The ratio between the number of oral papers and the number of poster papers presentations will be 1:1.
- The potential participants of panel discussion are the world-class researchers from both academia and industry and workshop authors. The panel discussion will focus on at least 8 selected related open questions, such as "Implementation challenges of AI in NGWNs", or "Potential applications of AI in wireless networks", "Applications of large language model in NGWNs", etc.
- For the paper review, each submission will be handled by one TPC Co-Chair without conflict of interest. Each paper will be assigned with at least 4 independent reviewers. After receiving enough review comments, we will rank the papers based on the scores, and then determine the accepted papers.

1. Tentative Workshop Schedule

9:00-9:05	Welcome Speech
9:05-9:45	Keynote Speech 1 (Prof. Yu Cheng)
9:45-10:25	Keynote Speech 2 (Prof. Takayuki Nishio)
10:25-10:40	Coffee Break
10:40-12:00	Oral Session 1 (4 papers)
12:00-13:30	Lunch Break
13:30-14:50	Oral Session 2 (4 papers)
14:50-15:00	Coffee Break
15:00-16:30	Poster Session (8 papers)
16:30-17:30	Panel Discussion

2. **Expected Number of Papers and Attendees**

The CFP will be advertised in various relevant communities in order to reach out to potential authors (e.g., academic researchers, wireless engineers, vehicle engineer, AI engineers, etc.) and will be circulated by the TPC members who are based in different regions across the world. Moreover, we expect at least 60 attendees due to the importance of the technical areas addressed and the participation of world-class speakers. Overall, we expect around **40** submissions, where we plan to accommodate **16** papers for oral (8 papers) and poster presentations (8 papers). Accordingly, the acceptance rate will be around **40%.**

VII: Publicity and Promotion Plan

The CFP will be advertised in numerous relevant events and venues to reach potential attendees and contributors, such as the mail list (IEEE ComSoc, IEEE CS, etc.), social networks: LinkedIn, ResearchGate, Twitter, Facebook, WeChat, personal blogs, etc. The chairs will send a chair email to IEEE technical committee mailing lists. To fully use these channels, we propose a three-stage publicity plan:

1. **[Apr.1-June 1] Informing potential authors.** Online the website as soon as the proposal is granted. A poster will be sent from the mail lists, such as IEEE ComSoc, IEEE CS, CCF, ACM, Huawei, and organizer's personal network. The organizers will include the workshop information into their slides, when they are attending Globecom 2024, INFOCOM 2024, MobiCom 2024 and ICC 2024.
2. **[June 1-Paper Deadline] Notify the deadlines to promote submissions.** A new poster that highlights submission deadline will be send from the mail lists and organizer's personal network. A press release will be published through social medias, such as personal blog. LinkedIn. twitter and WeChat blog.
3. **[Paper Deadline-Dec. 9] Attract the attendees.** A series of press releases will be published on social media. These press releases will shortly describe the importance of accepted works and the confirmed world-famous attendees, in order to attract more attendees.

IEEE GLOBECOM 2024 Workshop on Ubiquitous Network Intelligence for Next Generation Wireless Networks (NGWNs)

Call for Papers

The next generation wireless networks (NGWNs) are expected to support increasingly heterogeneous networking paradigms, adapt to dynamic network environments, and provide diversified intelligent services with stringent quality of service (QoS) requirements. To this end, artificial intelligence (AI) will penetrate and be integrated into every facet of the network, including end users, network edge, and the cloud, resulting in the ubiquitous network intelligence. The ubiquitous network intelligence can be enabled from two perspectives: AI for networking and networking for AI. The former is to leverage and customize AI-based methods for complex network management in NGWNs, while the latter is to design and optimize NGWNs to facilitate service-oriented AI applications (i.e., AI services). However, realizing ubiquitous network intelligence confronts different challenges. It should support various AI services with distinct QoS requirements in terms of latency, reliability, accuracy, etc. In addition, the service demands exhibit spatial and temporal dynamics due to traffic burstiness and user mobility. It is of paramount importance to improve the utilization of heterogeneous sensing, communication, computing, storage, and control resources for determining fine-grained user-centric networking solutions.

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- Security and privacy in ubiquitous network intelligence
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- Task offloading for intelligent applications
- Cooperative AI model training and inference
- Data collection for ubiquitous network intelligence
- Mobile edge computing/caching for NGWNs
- AI-based network management for NGWNs
- Digital twin assisted NGWNs
- Intelligent user-centric network management

Paper Submission: Papers must be formatted in the standard IEEE two-column format that is used by the GLOBECOM 2024 main conference, and must not exceed **six** pages in length (including references). All submitted papers will go through a peer review process, and all accepted papers which are presented by one of the authors at the workshop will be published in the IEEE GLOBECOM 2024 proceedings and IEEE Xplore.

Committee

General Co-chairs

Ning Zhang (University of Windsor, Canada)
Tom H. Luan (Xi'an Jiaotong University, China)

Technical Program Co-chairs

Wen Wu (Peng Cheng Laboratory, China)
Katsuya Suto (University of Electro-Communications, Japan)
Omar Alhussein (Khalifa University, UAE)
Yujie Tang (Dalhousie University, Canada)
Meng Qin (Peng Cheng Laboratory, China)

Publicity Co-chairs

Qihao Li (Jilin University, China)
Kaige Qu (University of Waterloo, Canada)

Important Dates:

- Submission Deadline: tentative
- Acceptance Notification: tentative
- Camera Ready: tentative
- Workshop: Dec. 8, 2024