**Special Session Proposal for CloudCom 2025**

Title: Semantic Communication in Cloud Computing: Theory, Algorithms, and Applications

Organizers:

Li Zhou, National University of Defense Technology, [zhouli2035@nudt.edu.cn](mailto:zhouli2035@nudt.edu.cn)

Xiaodong Xu, Beijing University of Posts and Telecommunications, [xuxiaodong@bupt.edu.cn](mailto:xuxiaodong@bupt.edu.cn)

Zhaolong Ning, Chongqing University of Posts and Telecommunications, [ningzl@cqupt.edu.cn](mailto:ningzl@cqupt.edu.cn)

Yong Xiao, Huazhong University of Science and Technology, [yongxiao@hust.edu.cn](mailto:yongxiao@hust.edu.cn)

Nan Li, King's College London, [nan.3.li@kcl.ac.uk](mailto:nan.3.li@kcl.ac.uk)

Abstract:

Semantic communication is an emerging paradigm that shifts the focus from traditional bit-level transmission to the exchange of meaningful information, optimizing communication efficiency and intelligence in cloud computing environments. With the rapid growth of AI-driven multimedia applications (voice, image, video), edge computing, and IoT, semantic communication offers novel solutions to challenges such as bandwidth constraints, latency, and energy efficiency by transmitting only semantically relevant data.

This workshop aims to bring together researchers and practitioners to explore the latest advancements in semantic communication, including theoretical foundations, algorithmic innovations, and real-world applications in cloud computing. We invite original research contributions, position papers, and case studies that address key challenges and opportunities in semantic-aware communication systems, with a special focus on multimedia data processing and transmission.

Topics of interest include, but are not limited to:

A. Theoretical Foundations

* Semantic information theory
* Knowledge-driven communication models
* Semantic-aware network architectures

B. Algorithmic Innovations

* Deep learning for semantic encoding/decoding of multimedia (voice, image, video)
* Reinforcement learning for adaptive semantic communication
* Federated learning in semantic communication

C. System Optimization

* Resource-efficient semantic transmission for multimedia
* Latency and energy optimization in semantic-aware streaming
* Cross-layer semantic communication for real-time media

D. Security and Privacy

* Trustworthy semantic communication for multimedia
* Privacy-preserving semantic data exchange in video/audio analytics
* Adversarial robustness in semantic networks

E. Applications

* Semantic communication for multimedia (voice, image, video)
  + AI-driven semantic compression for video streaming
  + Context-aware speech and audio transmission
  + Intelligent image retrieval and transmission
* Semantic communication in IoT and edge computing
* AI-driven cloud services with semantic understanding
* Semantic-aware 6G and future networks

Format and Duration:

[Specify the format (e.g., paper presentations, keynotes, panels) and the expected duration (half-day or full-day).]

This special session is planned as a half-day event and will feature oral paper presentations.

Expected Number of Submissions:

30-50

Previous Editions:

None.

Program Committee:

Haitao Zhao, National University of Defense Technology, China, haitaozhao@nudt.edu.cn

Hei Victor Cheng, Department of Electrical and Computer Engineering, Aarhus University, Denmark, [hvc@ece.au.dk](mailto:hvc@ece.au.dk).

Zixin Wang, , Department of Electronic and Computer Engineering, Hong Kong University of Science and Technology, Hong Kong, China, [eewangzx@ust.hk](mailto:eewangzx@ust.hk).

Jia Guo, School of Electronic Engineering and Computer Science, Queen Mary University of London, United Kingdom, [jia.guo@qmul.ac.uk](mailto:jia.guo@qmul.ac.uk).

Yichi Zhang, National University of Defense Technology, China, zhangyichi13@nudt.edu.cn.

Important Dates:

• Paper Submission: September 6, 2025

• Notification of Acceptance: October 4, 2025

• Camera-Ready: October 30, 2025

• Special Session Date: November 13, 2025 (TBC)

Contact:

For any questions regarding this proposal, please contact:

[zhouli2035@nudt.edu.cn](mailto:zhouli2035@nudt.edu.cn)