

Preserving Privacy in Edge Caching Networks

Seyedeh Bahereh Hassanpour

University of Tehran

Abstract

Edge computing uses edge caching to store popular content close to end-users. Edge caching involves two phases: cache content placement (CCP) and content delivery (CD). Optimal content placement in the CCP phase minimizes the number of transmissions, resulting in lower data access latency and bandwidth usage and enhancing the user experience. Despite the advantages edge caching provides, this proximity amplifies vulnerability to adversarial nodes, risking unauthorized access and data breaches. Despite encryption measures, network traffic can inadvertently expose sensitive information, facilitating side-channel information (SCI) attacks. Various entities, including ISPs and cache owners, actively monitor and eavesdrop on encrypted traffic for motives ranging from QoS improvement to data sharing with third parties, compromising user privacy. This decreases the users' trust in smart devices. Current solutions to tackle privacy issues, such as encryption-based, information-theoretic-based, and traffic shaping-based methods, have multiple drawbacks. For example, energy and computational constraints, a lack of scalability, and disrupting network predictability. This talk will discuss how careful content placement in the CCP phase may preserve privacy in the presence of an adversary node monitoring the edge-upper layer communication channel.

Biography

Seyedeh Bahereh Hassanpour obtained her Bachelor of Science (B.Sc.) and Master of Science (M.Sc.) degrees in Computer Engineering from Shahid Beheshti University (SBU) and Khajeh Nasir Toosi University (KNTU) in Iran, graduating in 2012 and 2016, respectively. In 2024, she completed her Ph.D. in Computer Engineering from the University of Tehran, Iran. Her research focuses on content-caching networks, privacy-preserving techniques in edge, and network stochastic optimization.

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