THE QUEST FOR INFORMATION-CENTRIC NETWORKING


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Information-Centric Networking (ICN) is an approach that shifts the Internet infrastructure from a host-centric paradigm, based on perpetual connectivity and the end-to-end principle, to a new paradigm where named data becomes independent from location, application, storage, and means of transportation, enabling in-network storage and replication. The expected benefits include improved efficiency, better scalability with respect to information/bandwidth demand, and better robustness in challenging communication scenarios. As the most promising clean-slate approach for future Internet, ICN has attracted much attention in the past few years, and created a trajectory that is to replace the current IP-based Internet.

There have been many prototypes of ICN, but more research is still ongoing, which includes naming, forwarding/routing, and caching policy, deployment strategy, security policy, and so on. All these aspects have not yet been recognized and still require practical solutions. In order to guide the next stage of R&D, we need to re-examine the existing design principles, ideas, and goals to summarize success or failure. We then refine key theoretical issues and technical difficulties to provide feasible solutions. This is the purpose of this Feature Topic. We received 31 submissions, and after a rigorous review process, six articles were accepted for this Feature Topic. We are confident that these articles will contribute to the quest for information centric networking. A brief description of each of the articles follows.

In the first article, "Content Request Handling for Application-Oriented Transport Control," Matsuzono *et al.* investigate the effectiveness of three types of requests: pipeline, symbolic interest, and any next packet, when they are separately used as the transport control scheme in an ICN network. Through several performance evaluations, the authors further identify the characteristics and best use cases of each type of request as well as potential challenges.

In the second article, "A Blockchain-based Data Lifecycle Protection Framework for Information-Centric Network," Li and Asaeda identify the attacks and design requirements for data lifecycle protection in ICN. The authors further propose a blockchain-based data lifecycle protection framework, which exploits the transaction and smart contract to provide a trusted and neutral environment in ICN.

In the third article, "Securing ICN-based UAV Ad Hoc Networks with Blockchain," Lei *et al.* first identify security threats in NDN-based UAANETs, and then propose a novel and systematic framework, which integrates interest-key-content binding (IKCB), forwarding strategy, and on-demand verification to efficiently discover poisoned content. To further provide decentralized IKCB store and detect internal attackers, the authors introduce a lightweight permissioned blockchain system over NDN and develop a scalable adaptive delegate consensus algorithm.

In the fourth article, "An Orchestrated NDN Virtual Infrastructure Ttransporting Web Traffic: Design, Implementation and First Experiments with Real End-Users," Doyen *et al.* present the feedback experience of the real deployment of ICN's most widely researched architecture called Named Data Networking (NDN). In this work, by reconfiguring a virtualized NDN network, NDN has been deployed as an overlay on the IP network through dedicated gateways and network functions virtualization (NFV).

In the fifth article, "Powering Smart Homes with Information-Centric Networking," Xu *et al.* introduce a novel concept of intelligent and programmable home ICN routers, which serve as the last-hop and last-mile routers in ICN network architecture. Home ICN routers are enhanced with the features of at-edge cooperative caching for efficient content distributions, content modeling for security monitoring, and a delegation model of security operations for resource constrained IoT devices.

In the last article, "Artificial Intelligence for Information Centric Networks," Yao *et al.* survey how to utilize the computational and analytical features of artificial intelligence (AI) to help the ICN break through the bottleneck of existing technology development, such as naming, transmission control, and content placement. This work actually opens up a new way to solve essential issues in ICN.

Finally, we would like to thank Dr. Tarek El-Bawab, Jennifer Porcello, Antonio Sanchez, and Joseph Milizzo for their continuous support and constructive suggestions to improve this Feature Topic. Meanwhile, we hope that the readers will find the articles published in this Feature Topic interesting and helpful with further research in Information Centric Networking.

BIOGRAPHIES

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