

An Introduction to NDN and its Software Architecture

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MOTIVATION

The NDN project investigates Jacobson's proposed evolution from today's host-centric network architecture (IP) to a data-centric network architecture (NDN). This conceptually simple shift has far-reaching implications in how we design, develop, deploy and use networks and applications. The NDN design and development has attracted significant attention from the networking community. To facilitate broader participation in addressing NDN research and development challenges, this tutorial will describe the vision of this new architecture and its basic components and operations.

Categories and Subject Descriptors

C.2 [Computer Systems Organization]: COMPUTER-COMMUNICATION NETWORKS; C.2.1 [Network Architecture and Design]: Packet-switching networks—Internet

Keywords

Network architecture; Named Data Networking

Tutorial Outline

- The NDN architecture and applications.
- Library support for application development.
- The NDN routing protocol and forwarding daemon (NFD).
- The NDN testbed: current operations, monitoring tools and procedures for participation.
- Open challenges in NDN design and development, to share with the community and invite efforts in addressing them.
- Illustrations of installation and use of the NDN platform and simulator, as well as HOWTOs to assist in further development.

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About the Speakers

Dr. Alexander Afanasyev is a postdoctoral scholar at the University of California, Los Angeles. His research interests include network systems and protocols, future Internet architectures such as Named Data Networking, and network security mobile systems, multimedia systems, and peer-to-peer environments.

Jeff Burke is a Co-PI and application team lead for the Named Data Networking research project. He is Asst. Dean for Technology and Innovation at the UCLA School of Theater, Film and Television (TFT), where he co-founded REMAP, a joint center of TFT and the Henry Samueli School of Engineering and Applied Science, which uses a mixture of research, artistic production, and community engagement to investigate the interrelationships among culture, community, and technology.

Patrick Crowley is an Associate Professor in the Department of Computer Science & Engineering at Washington University in St. Louis. He is also founder and CTO of Observable Networks, an early-stage network security company. His research interests are in computer and network systems architecture, with a current focus on information-centric networking, programmable network systems design, and the invention of superior network monitoring and security techniques.

Steve DiBenedetto is a PhD student at Colorado State University. His research interests include ICN security and inter-domain routing policies. Steve is a NDN Forwarding Daemon (NFD) developer and previously co-developed ANDaNA, a Tor-like onion routing application for CCNx.

Jeff Thompson has been a staff software engineer at UCLA REMAP for the Name Data Networking (NDN) project since 2013. As an undergraduate, he studied computer science and electrical engineering at MIT. His Masters work was in microrobotics and automation at the UC Berkeley Biomimetic Millisystems Lab.

Dr. Beichuan Zhang is an Associate Professor at the Computer Science Department, the University of Arizona. His research interest is in Internet routing architectures and protocols. He has been working on Named Data Networking, green networking, network topology, and overlay multicast.

Lixia Zhang is a professor in the Computer Science Department of UCLA. In the past she served on the Internet Architecture Board, the editorial board of the IEEE/ACM Transactions on Networking, vice chair of ACM SIGCOMM, and co-chair of the Routing Research Group under IRTF. Her research interests include the Internet architecture and protocol designs.