Simulation Platform for Content Centric Networks Protocols Development

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Abstract

This work presents a complete solution to develop, and test, new algorithms over simulated Content Centric Networks (CCN). For economical and practical reasons today it is hard to deploy CCNx over large network setups. As a result, the greatest part of the researchers evaluate their propositions over small and static topologies, i.e. networks smaller than 10 nodes and, typically, always connected in the same way. Although these small network topologies may validate a new approach, and identify performance tendencies, they are not representative enough to evaluate the full impact/overhead of protocols over realistic scenarios. Using the simulation environment proposed here, one can simulate large, and complex, networks setups inside their own machines. The framework uses Direct Code Execution (DCE) to run unmodified CCNx code over real, or simulated, network stacks on the top of the ns-3 network simulator.

Keywords: Validation; Simulation; Emulation; Troubleshooting
Presentation type: Technical talk

Presentation

The platform described in this work enables researchers to perform large scale experiments, in a controllable, realistic and repeatable way. The proposed framework relies on the combination of three main pieces of software: CCNx, ns-3, and Direct Code Execution (DCE) tool. DCE is a package we developed that is able to run, without any source code modification, real applications and protocols over the ns-3 simulator. Ns-3 is a powerful open source discrete-event network simulator. The framework trusts ns-3 to handle all the nodes interconnections and topology related issues. DCE is responsible for running the unmodified CCNx code and making the interface between CCNx and the simulator. The framework opens the gates for the CCNx community to the full power of the ns-3 simulator, and all its modules (e.g. WiMax, WiFi and LTE implementations). It is important to notice that, as the platform uses DCE to run the real CCNx, the very same code, developed using the simulated framework, can be executed over real networks without any change. Moreover, the platform allows developers to use standard debuggers to evaluate the status of the whole simulated network. One can, for example, add breakpoints and verify the state of variables and packet headers on any layer, of any node, of the simulated network. The proposed CCNx simulation platform is a valuable tool that intends to help researchers in the implementation, evaluation and troubleshooting of new CCN algorithms and applications.

Interests

Experimental results of research issues, e.g. caching, routing and resource management