

Cheng-cheng Li, Ren-chao Xie, Tao Huang, Yun-jie Liu, 2017. Jointly optimized congestion control, forwarding strategy, and link scheduling in a named-data multihop wireless network. *Frontiers of Information Technology & Electronic Engineering*, **18**(10):1573-1590. <http://dx.doi.org/10.1631/FITEE.1601585>

Jointly optimized congestion control, forwarding strategy, and link scheduling in a named-data multihop wireless network

Key words: Information-centric networking; Congestion control; Cross-layer design; Multihop wireless network

Corresponding author: Cheng-cheng Li

E-mail: 931138419@163.com

 ORCID: <http://orcid.org/0000-0003-3507-8935>

Motivation

- Named Data Networking (NDN) has advantages for building Multihop Wireless Networks (MWNs) compared with IP.
- Cross-layer congestion control in named-data MWNs may be a potential solution to enhance the throughput of the network and to improve the efficiency of resource utilization.
- Cross-layer congestion control mechanisms for MWNs with IP cannot be applied to named-data MWNs.

Main idea

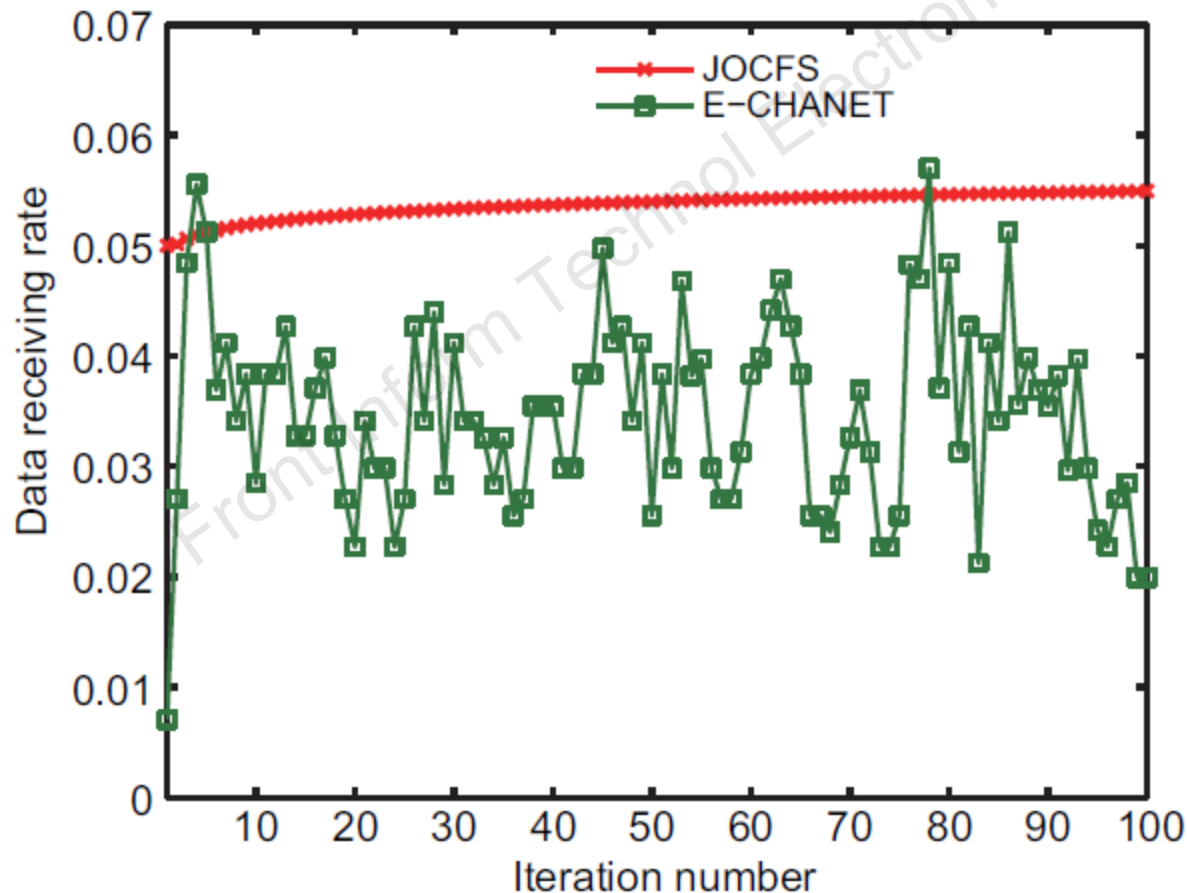
- Design cross-layer mechanism for congestion control, forwarding strategy, and link scheduling for named-data MWNs.
- Propose an iterative and distributed algorithm named ‘jointly optimized congestion control, forwarding strategy, and link scheduling (JOCFS)’.

Method

1. Model the JOCFS problem as a Network Utility Maximization (NUM) problem that aims at enhancing the overall network utility and stabilizing the network.
2. By the Lagrangian relaxation and dual decomposition, we obtain two subproblems to prepare for calculating the approximate subgradient of the dual function. Enlightened by the approximate subgradient algorithm to solve the dual problem, we propose an iterative and distributed algorithm called 'JOCFS' to solve the NUM problem.

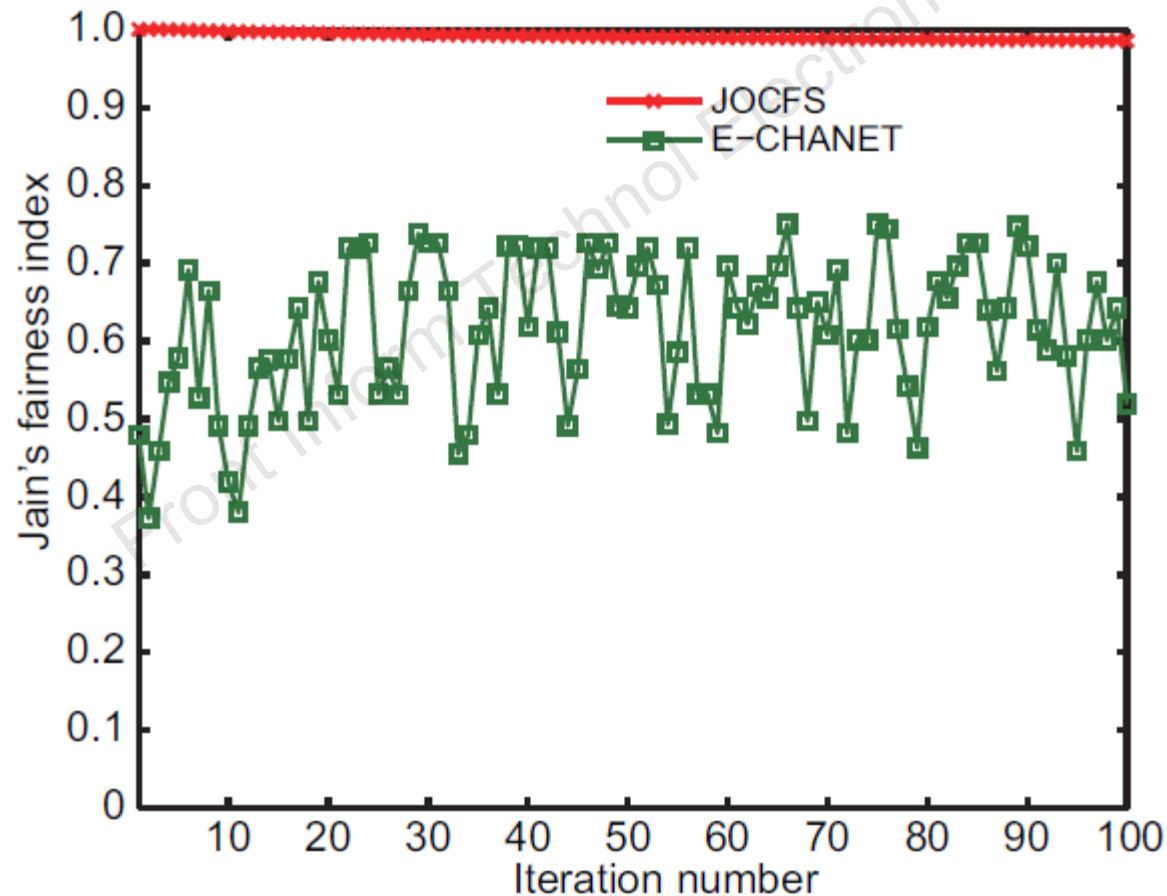
Major results

- JOCFS can achieve larger throughput than E-CHANET



Major results

- DRS can achieve better fairness



Conclusions

- From both analysis and simulation, we find that cross-layer congestion control outperforms independent optimization of congestion control for named-data MWNs.