Mingjie Feng, Shiwen Mao, Tao Jiang, 2016. Enhancing the performance of future wireless networks with software-defined networking. *Frontiers of Information Technology & Electronic Engineering*, **17**(7):606-619.
http://dx.doi.org/10.1631/FITEE.1500336

Enhancing the performance of future wireless networks with software-defined networking

Key words: Software-defined networking (SDN), Software-defined wireless networks (SDWN), OpenFlow, Performance enhancement

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Motivation

- The current wireless network has become highly complex and heterogeneous. Thus, network management is a challenge.
- Software-defined networking (SDN) is an efficient solution to network management problems.
- The SDN approach has been applied in various kinds of wireless networks. It is necessary to summarize and analyze such applications in different networks and discuss some directions for future research in the area.

Main idea

- We analyze the application of SDN in several wireless networks with focus on performance enhancement, and present some potential future research directions.
- Our analysis and discussion include wireless mesh network, wireless sensor network, heterogeneous cellular network, device-to-device communication, cloud radio access network, user-centric network, cognitive radio network, and wireless local area network.

Method

1. We first review the applications of SDN in existing wireless networks and present detailed analysis.
2. Based on the analysis, we present the methods that can be used to enhance a wireless network with SDN approach.
3. In particular, we discuss the application of SDN in several important technical aspects: access control, mobility management, interference management, load balancing, resource sharing, and offloading strategy.

Major results

- We present the following directions for future research: compatibility problem, application in femtocaching, and scability problem.

Conclusions

- We investigated the architecture and technical aspects of wireless networks with SDN approach.
- We discussed how the SDN approach could enhance the performance of a wireless network.
- We presented several problems for possible future research.