

SDN Wi-Fi Ad-hoc Mode Network

Overview

SDN Wi-Fi Ad-hoc simulation module is an optional add-on to EstiNet network simulator and emulator. It provides the simulation of an SDN mobile device that is equipped with two Wi-Fi interface cards – one is for the control plane and the other is for the data plane. An SDN mobile device can play the role of data forwarder (an agent) or routing-path arbitrator (a controller). No OpenFlow messaging is used in this kind of networks. Instead, a suite of control messages are defined to support the required SDN operations.

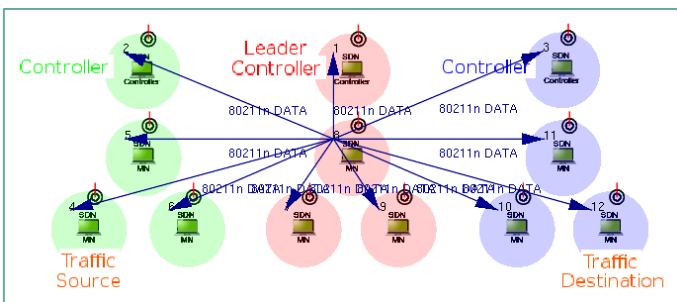
Key Features and Benefits

Support SDN Data Plane Forwarder

By using SDN-enabled mobile devices, users can simulate an SDN Wi-Fi ad-hoc network. The mobile device is equipped with two Wi-Fi interface cards. One is for transmitting/forwarding/receiving data packets on the data plane, the other is for communicating with the SDN-controller mobile device on the control plane. In addition, the mobile device maintains a routing table for storing the routing rules that are remotely set by the SDN controller.

Support SDN Data Plane Routing-path Arbitrator

An SDN-enabled mobile device can play the role of SDN controller. This controller has the global view of the mobile ad-hoc network and periodically monitors the dynamics of network topology. With this capability, an SDN-style (e.g., centralized) routing mechanism can be applied on the controller. In other words, the controller plays the role of routing-path arbitrator of ad-hoc network. Users are able to evaluate the feasibility and performance of SDN-style routing mechanism on this platform.



OpenFlow

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Major Functions for SDN Wi-Fi Network

SDN Operations

- Control Plane Network
 - Ad-hoc Mode or Infrastructure Mode Wi-Fi Network
 - Ad-hoc Mode Routing Protocol: AODV
 - SDN Control Messages for Routing Operations
 - Hello Message
 - For Neighbor Discovery on Each Agent
 - Neighbor Update Message
 - From Agent to Controller
 - Between Leader and Other Controllers
 - Data Plane Routing Rule Update Message
 - From Controller to Agent
- Data Plane Network
 - Ad-hoc Mode Only Wi-Fi Network
 - Shortest Path Routing Protocol based on Dijkstra's Algorithm Applied on Each Controller

Controller Backup Mechanism

- On each agent device, a list of controller device can be manually assigned. The first controller on the list is the default controller for an agent device, and the others are backup controllers.
- One controller shares its received neighbor update messages with other controllers through the Leader Controller. Thus, every controller has the global view of network and can be a backup for other controllers.