

Ultimate Performance of Wi-Fi Access Points With Multiple Interfaces: An Application of Software Defined Network

Yu-Ju Lee* †, Wen-Wei Liao†

* *Department of Computer Science, University of Colorado Boulder, Boulder, Colorado 80309-0430 USA*

† *University of Colorado Boulder, Cooperative Institute for Research in Environmental Sciences at
NOAA/OAR/ESRL/Global Systems Division*

Yuju.Lee@Colorado.EDU, WenWei.Liao@Colorado.EDU

Abstract—Wi-Fi become the more popular wireless technology in our living environment. More than one wireless access point to assemble a wireless distribution system is not exclusive to the enterprise. However, current Wi-Fi protocol has no central control mechanism and efficiency cooperation mode between different wireless access points. In this research we proposed a wireless distribution system with software define network controller which provide the following properties. First, this system separates the control plane and data plane with different wireless interfaces. Second, different traffic flows from one access point to another could be assigned with independent, non- mutual interference channels if wireless resource is enough to achieve high throughput performance for whole wireless system. Third, the SDN controller is centralized unit and could execute the global channel optimization rather than regional channel optimization between two adjacent wireless access points. This system facilitated current wireless infrastructure to build the control plane. It utilizes the central Software Defined Networking (SDN) controller to collect required information from different access points, distribute resources to different access points and control the traffic flows. We demonstrate how wireless system with a central control unit could enhance the channel optimization and improve the whole system performance. Experiment to verify our idea is completed by Network simulation 3 (NS-3). The result shows with reasonable channel assignment, the wireless distribution system could optimize all wireless access points interfaces.

Keyword—Wi-Fi, SDN, Opti-mization, Network simulation 3, NS-3



Yu-Ju Lee received his B.S. degree in electrical engineering from National Chung Cheng University, Chaiyi, Taiwan, in 2005 and M.S. degree in electrical engineering from University of Southern California, Los Angeles, CA, USA, in 2010. He is currently working toward his Ph.D. degree in computer science at University of Colorado Boulder, Boulder, CO, USA. Before joined CU Boulder, he worked as a system architecture engineer and had several patents in Wi-Fi, Bluetooth and embedded system. His research interests are in applying machine learning and deep learning to enhance system performance, embedded system and networking design and analysis, and Multi-User MIMO (MU-MIMO) in Wi-Fi and multi-radios coexistence system.