

# Balancing Exchange Points Communication and Inter-controller Communication for Inter-Domain Routing

Adrian Lara and Byrav Ramamurthy\*

\*Correspondence Author

University of Nebraska-Lincoln, Lincoln NE 68588-0115

{alara,byrav}@cse.unl.edu - <http://cse.unl.edu/~byrav>

**Introduction.** Software-defined networking (SDN) promises to reshape wide area networks (WANs). In this whitepaper, we envision the role of SDN in the design of future inter-domain routing protocols. The limitations of the Border Gateway Protocol (BGP), today's de-facto inter-domain routing standard, are well known. Furthermore, opportunities to improve inter-domain routing using SDN have also been proposed. Gupta et al. [1] propose using software defined Internet exchange points (SDX) to collect routing information of multiple domains and distribute it to the controllers.

**Our work.** We believe that an alternative solution is to balance both SDX and inter-domain controller communication. Our approach is motivated by the inter-domain routing mechanisms of the MobilityFirst Future Internet Architecture (FIA). In MobilityFirst [2], a global name resolution service (GNRS) is available to resolve identifiers into network addresses. However, the GNRS can also be used to store any network object, such as a route, an inter-domain tunnel or even a group of SDN-compliant resources. Therefore, we work on identifying which information can be stored in the GNRS to be shared between domain controllers. Further, we believe that an inter-controller protocol is also necessary to initiate requests such as the creation of an inter-domain tunnel, or the termination of it.

**Need for testbeds.** To experiment with inter-domain communication in SDN, there needs to exist a testbed capable of both SDN control of network devices and inter-domain overlay. For example, a resource such as an SDN-based PlanetLab would have tremendous benefits on this type of research. Indeed, PlanetLab [3] is highly distributed across the planet and is facilitated by point-to-point communications across multiple autonomous systems. Following the same line of thinking, Carrozo et al. proposed the FELIX testbed as a first initiative to have federated resources across testbeds [3].

**Authors' background.** The authors of this whitepaper have studied how SDN will reshape network operation at multiple scales including campus networks and WANs. Likewise, they have proposed how SDN can be used to dynamically create cut-through switching tunnels in the MobilityFirst future Internet architecture<sup>1</sup>. The authors wish to be reimbursed for their travel expenses, if they are invited to attend the "Future Wireless Cities" Workshop.

[1] Gupta, A. et al. "SDX: A software defined internet exchange." Proceedings of the 2014 ACM conference on SIGCOMM. ACM, 2014.

[2] Raychaudhuri, D. et al. "Mobilityfirst: a robust and trustworthy mobility-centric architecture for the future internet." ACM SIGMOBILE Mobile Computing and Communications Review 16.3 (2012): 2-13.

[3] Carrozzo, G., et al. "Large-scale SDN experiments in federated environments." IEEE Smart Communications in Network Technologies (SaCoNeT), 2014.

---

<sup>1</sup> A list of publications is available at <http://cse.unl.edu/~alara/research.html>