OpenFlow: Enabling Innovation in Campus Networks

Title : Literature Review for “OpenFlow: Enabling Innovation in Campus Networks”
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The paper encourages the use of OpenFlow (a programmable network environment) within network switches inside college campus backbone and network wiring, to help and encourage networking researchers to test or run experimental protocols in actual real world traffic. It also describes how Stanford University plans to use Open Flow as a campus component and argues why our university ought to use it as well.

The paper highlights the possible reasons why the networking domain has been “ossified” and how the networking research domain is in great need to implement virtualized programmable networks. It explains how building a nationwide programmable network could be very costly and how building the same inside campus could be helpful and what challenges will be faced in doing the same. The paper argues about how few current commercial and educational resources like ATCA-based virtualized programmable router called the “Supercharged Planet-Lab Platform” or “Net-FPGA” won’t be a good fit in fulfilling the objectives as they are costly, gives excessive fanout, and many more reasons and hence not suitable for full scale deployment. The paper suggests an idea or approach of neglecting commercial/educational solutions and hints on the approach to using OpenFlow to achieve these objectives.

The paper explains OpenFlow as an open protocol that programs the flow table in different routers and switches and exploits sets of functions. Using OpenFlow, researchers can program only standard protocol instead of actually programming the switch. The paper also highlights different types or configurations of OpenFlow switches and also highlights specific features of its controller that highlight its advantage of using it as a programmable network. Dedicated OpenFlow switches are expected to either forward flow entry to a given port or encapsulate and forward to the controller or else drop the packet. The paper also explains the header format for OpenFlow switches, both of “Type 0” and “Type 1” which shows that TCP flows can be specified by header fields. The paper also highlights how Open Flow being implemented in commercial switches as it can provide flexibility for both researchers and network administrators to differentiate clearly between regular production traffic and experimental traffic. This is achieved by forwarding a flow’s packets through switches in a normal processing pipeline along with its ability to program flows using OpenFlow protocol and controllers. This is explained in the paper by giving an example of a researcher, Amy, who wants to test her protocol AMY-OSPF and how OpenFlow helps her in fulfilling experiment objectives.

Overall, I indeed agree with the publishers that OpenFlow is a realistic and practical way that can allow networking researchers to deploy and test their experiments on heterogeneous networks and switches and other networking elements, without exposing the internals of their protocol to methods of the open world. However, I doubt that the Open Flow network within universities could actually be connected using tunnels or any sort of distributed system in the future as it’s still too costly as a final cost product. But if it does become successful in nationwide deployment, it can greatly benefit the networking industry and could help in building up emerging networking software.

References :

[1] Nick McKeown, Tom Anderson, Hari Balakrishnan, Guru Parulkar, Larry Peterson, Jennifer Rexford ,Scott Shenker. “OpenFlow: Enabling Innovation in Campus Networks”, Volume 38, Number 2, April 2008, ACM SIGCOMM Computer Communication Review.