A Survey of Hybrid Software Defined Networks

Challenges, Opportunities, and Future Directions

Tiago Afonso Marques, 98459

Software Defined Network (SDN)

- SDN is a new approach that seeks to solve some of the problems within traditional networks:
  - Centralized Control
  - Network Programmability
  - Dynamic Adaptability
  - Vendor-Agnostic Abstraction
- However SDNs also bring disadvantages:
  - Scalability
  - Recent Technology
  - Costs
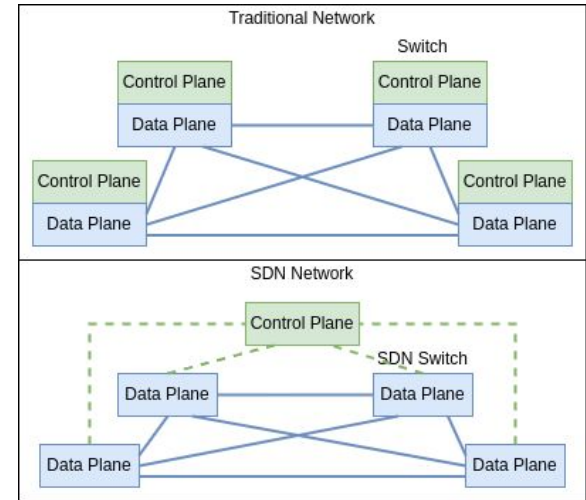

Traditional vs SDN Control Plane

Software Defined Network (SDN) - 2

- The characteristics of SDN make it particularly interessant for intelligent and dynamic networks

- Possibility to accommodate various type of devices

- However, in the present scenario, SDN based solutions are mainly designed for wired SDN-based devices:
    - OpenFlow protocol only supports Ethernet
    - Discovery Protocol, which uses OF, only work for SDN-based devices
   - Legacy devices go unnoticed within SDN

Hybrid Software Defined Network (hSDN)

- hSDN aims take integrate both traditional network and SDN paradigms, offering a hybrid network architecture
- Advantages:
  - Partial SDN benefits
  - Robust Traditional Routing Protocols
- Disadvantages:
  - Higher Management Complexity
  - Higher Data Plane Complexity
  - Scalability

Hybrid Software Defined Network Example
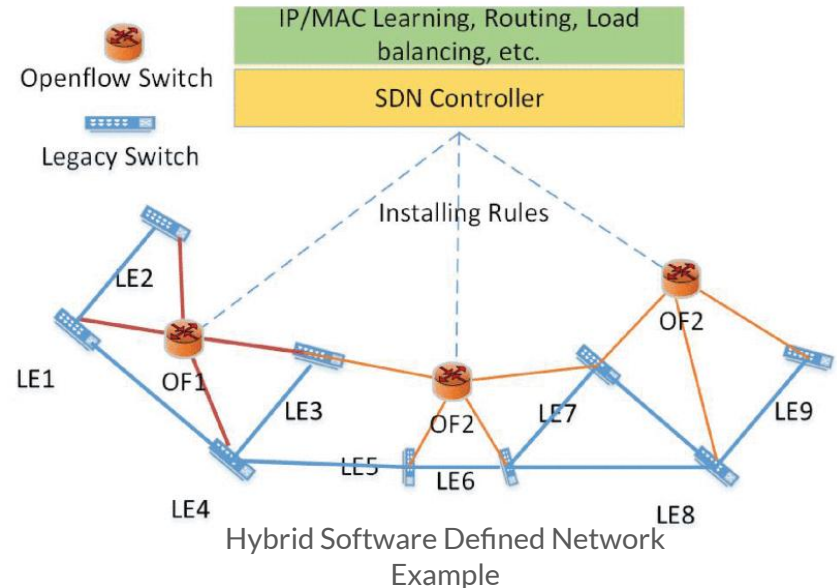
Topology/Link Discovery

- Is essential

- The vast majority of SDN controllers use OFDP

- This discovery protocol poses some challenges:
  - Repetitive/Periodic
  - Only works to discover links, direct and indirect, between SDN wired devices
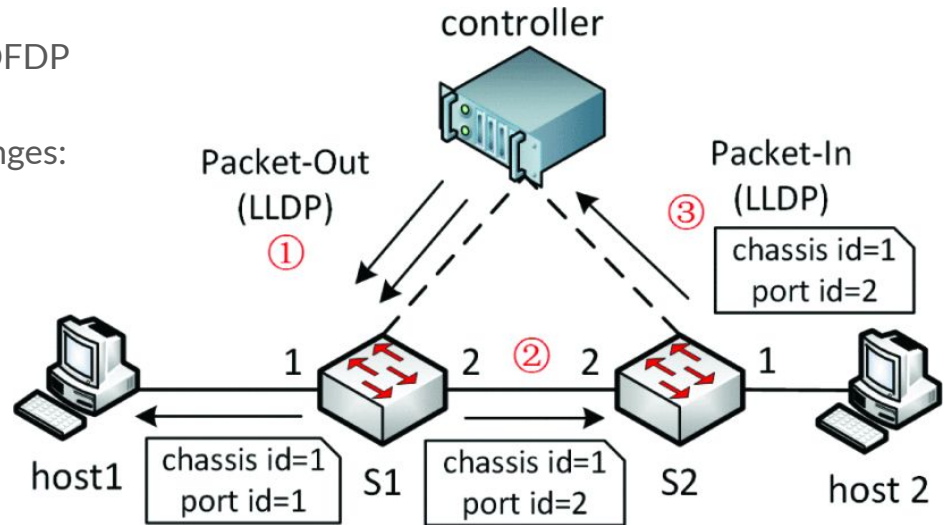
Related Work

- Stop repetitiveness:
    - Alterations to OFDP
    - New protocols where proposed

- Integration of the various devices within the controller view:
    - New architectures
    - New protocols
    - Combination of the existing protocols

Conclusion

- A total view of the network is necessary for enhancing network efficiency and management

- Various types of nodes brings continuous complexities

- Although SDNs are evolving, continued research and innovation is needed

Future Work

- Leverage the combination of protocols to discovery wired links between traditional and SDN devices

- Modify the SDN Controller (ONOS) to dynamically adapt to the movement of wireless mobile nodes within the network

- Extensive performance tests and comparisons against previous solutions