PolicyCop: An Autonomic QoS Policy Enforcement Framework for Software Defined Networks

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Roadmap

- Motivation
- Our Contribution
- Our Approach
- Simulation Results
- Conclusion & Future Work

Motivation

- Network management systems are being continuously challenged to satisfy application QoS requirements
- Policy based management can tackle these challenges
- Recently emerging field of Software Define Networking (SDN) can provide features like:
  - Per flow control
  - Dynamic flow aggregation
  - Dynamic traffic classes
  - Avoid protocol clutter problem
  - Ease of deployment
- Policy based management can be coupled together with SDN to provide autonomic policy based management

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Our Contribution

- We have designed and implemented a prototype of an autonomic QoS policy enforcement framework, PolicyCop that:
  - Leverages the programmability offered by SDN for
    - Dynamic traffic steering
    - Flexible Flow level control
    - Dynamic traffic classes
    - Custom flow aggregation levels
  - Monitors the network to detect policy violations
  - Reconfigures the network to reinforce the violated policy

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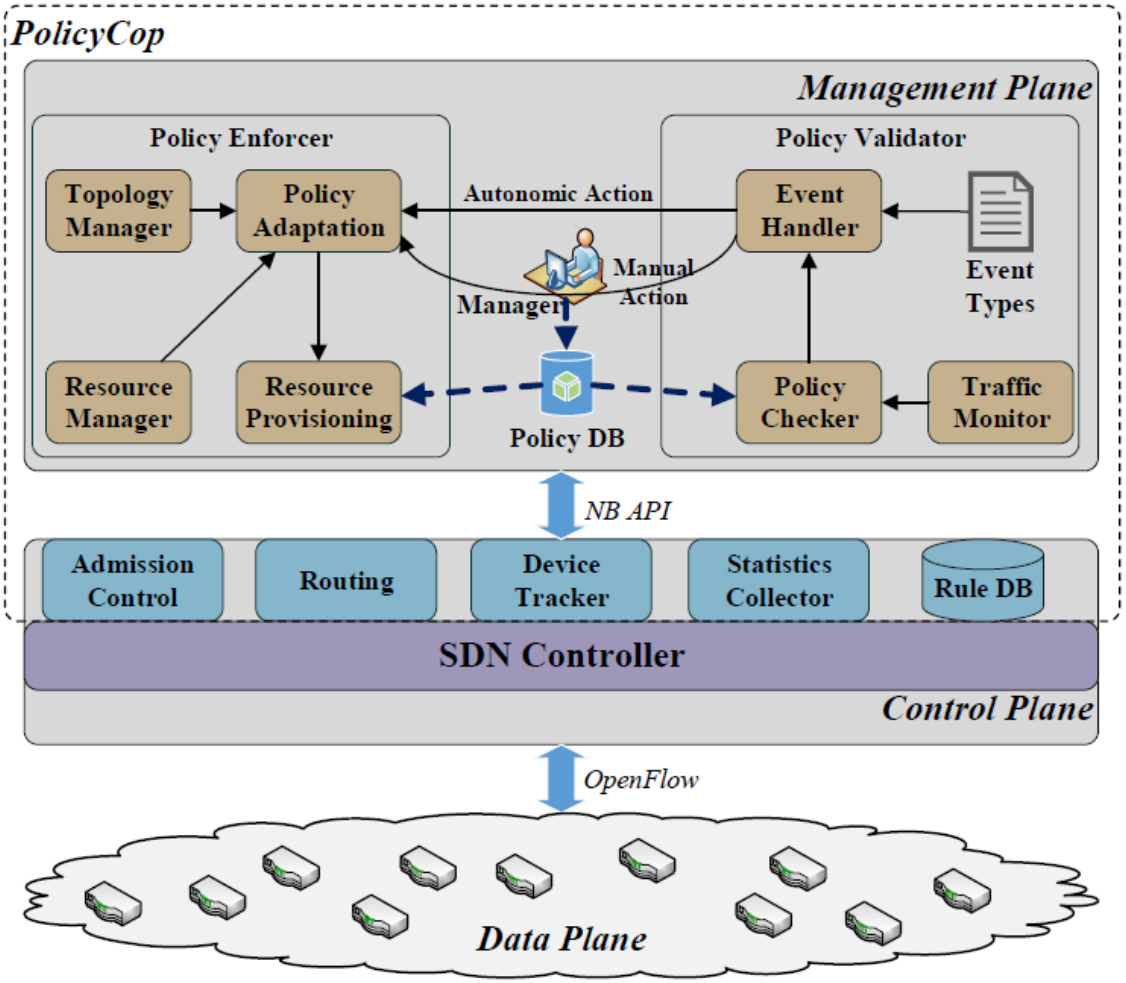
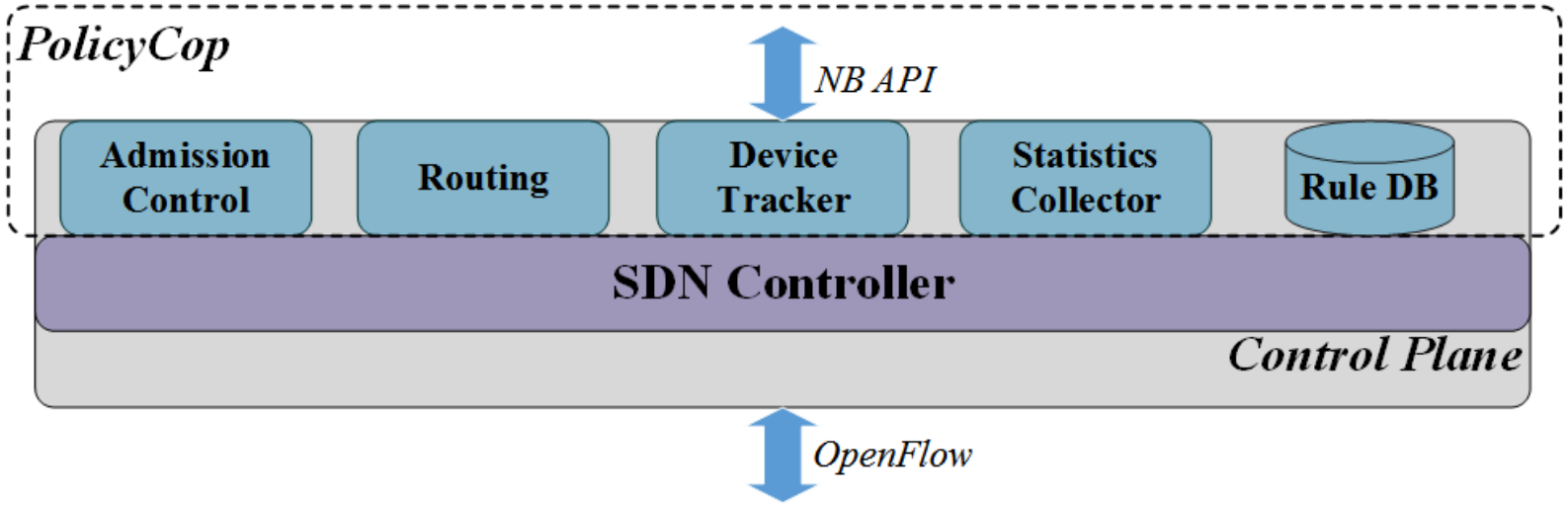
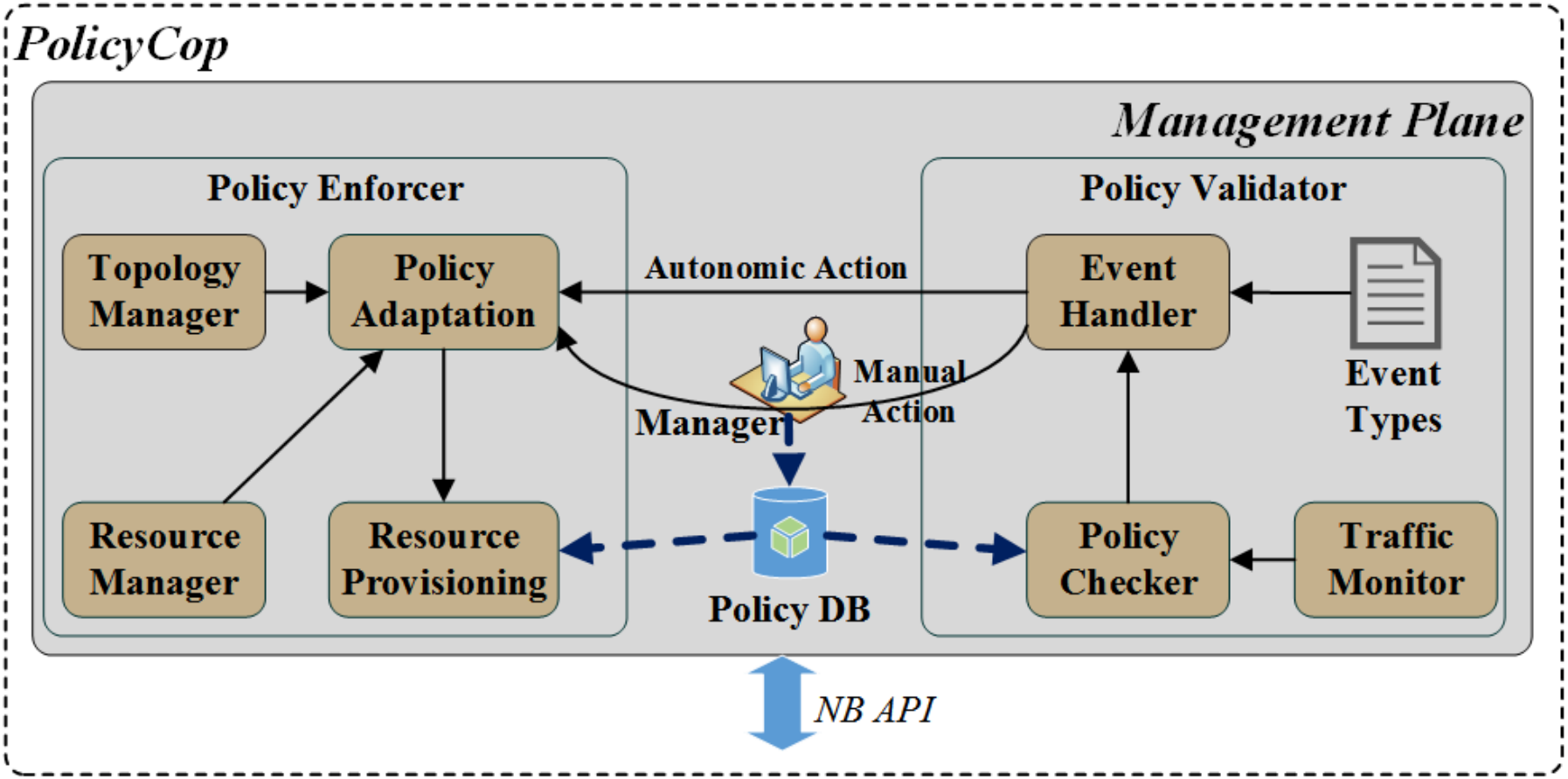
Our Approach



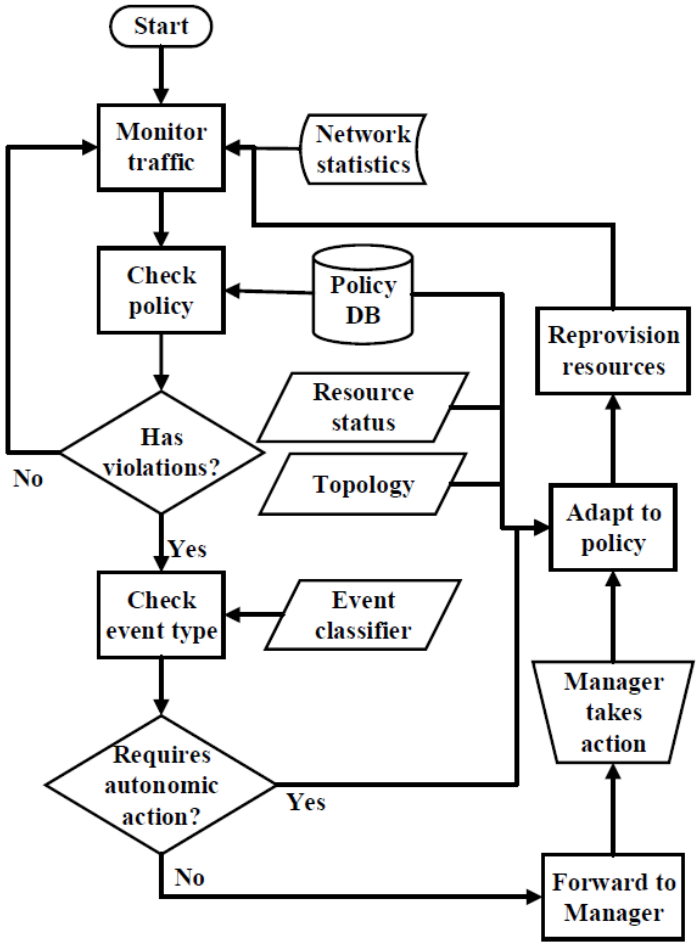
PolicyCop: Control Plane



PolicyCop: Management Plane



Our Approach (Workflow)



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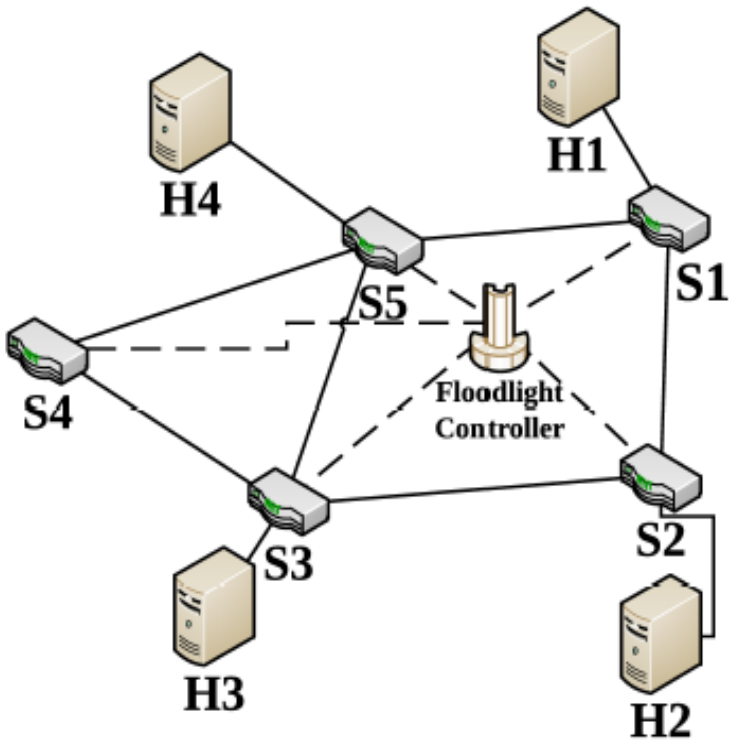
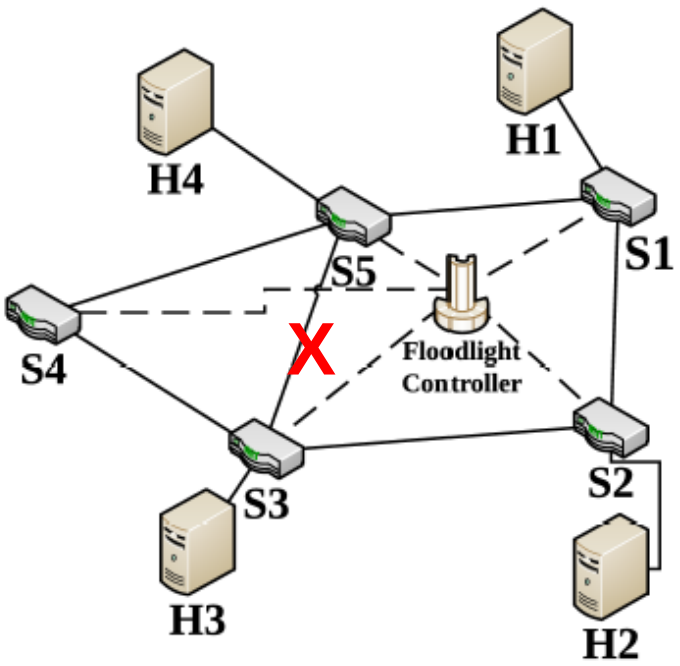
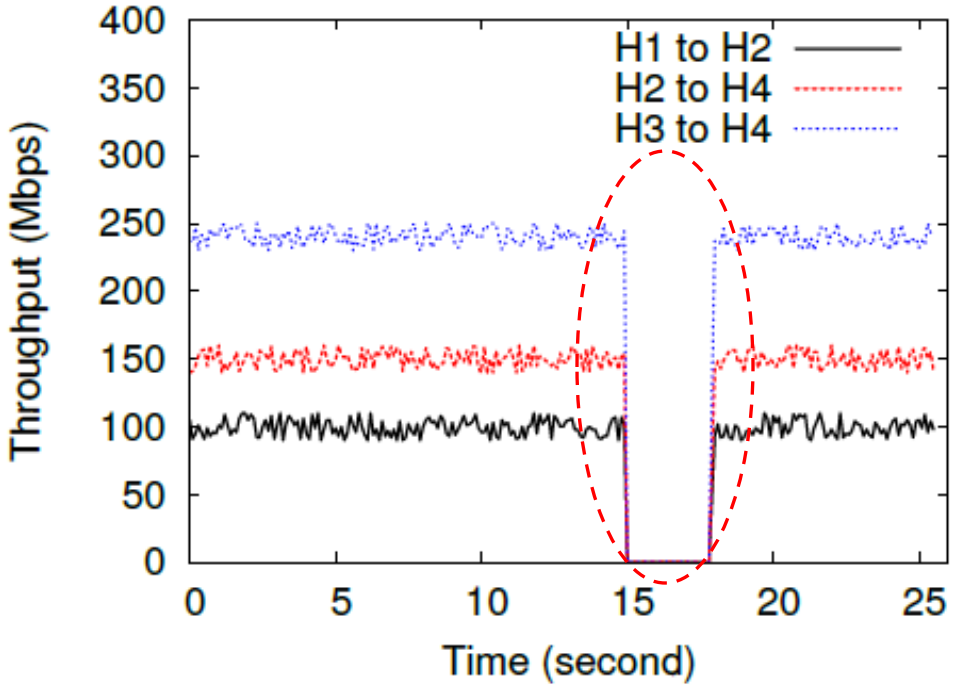
Experimental Setup



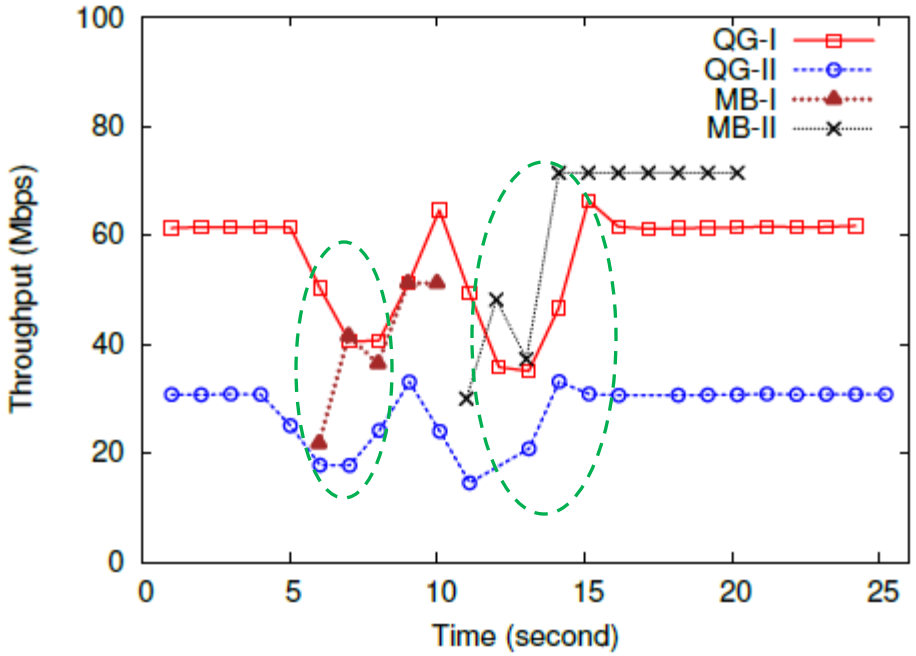
- 5 Open vSwitches (OVSs) & 4 hosts
- OVSs' interconnected with GRE tunnels to simulate bandwidth and latency
- One floodlight controller
- Used **`iperf`** to generate traffic

Use Case 1: Link Failure





Use Case 2: Throughput Violation



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Conclusion & Future Work

- We have
  - Presented the design of PolicyCop, an autonomic QoS policy enforcement framework for SDN
  - Demonstrated the effectiveness of PolicyCop through a working prototype
- Our next step
  - Implement all component of PolicyCop
  - Interface with existing policy specification languages (*e.g.,* Ponder)
  - Provide a collection of controller applications for other network management function

Questions?