Optimizing Rule Placement in Software Defined Networks

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1. Why & What is Software Defined Network?

Traditional networking approaches limit innovation because of the highly closed and proprietary devices.

- **Software Defined Network (SDN)**
  - (a) Separated data and control planes with standard interfaces
  - (b) A logically centralized control plane, which provides global view of network to network applications

2. Rule placement in SDN

Today's controller platforms force applications to configure each switch individually, and worry about switch rule capacity and interactions between rules on different switches.

- **Network application defines**
  - (a) Network-wide policy
    - End-to-End packet handling
    - e.g., Firewall
  - (b) Routing policy
    - Traffic Engineering
    - e.g., minimize latency

- **Controller computes rule placement**
  - Realize policies correctly
  - Minimize number of installed rules
  - *Stay within the rule capacity of switches*
  - Handle policy update incrementally

3. Optimize Rule placement

- **Distribute Policy over a chain**

  - Network-wide policy: $R_1 \rightarrow R_6$, ($\ast$: Fwd)
  - 2-hop chain

  - **Distribute Policy over a **graph**

  - (1) View graph as multiple paths
  - (2) Split shared switch capacity over multiple paths (using LP)
  - (3) Apply *chain* algorithm to each path