

# **Efficient Publish-Subscribe Architecture for the Smart Grid using OpenFlow and MPLS**

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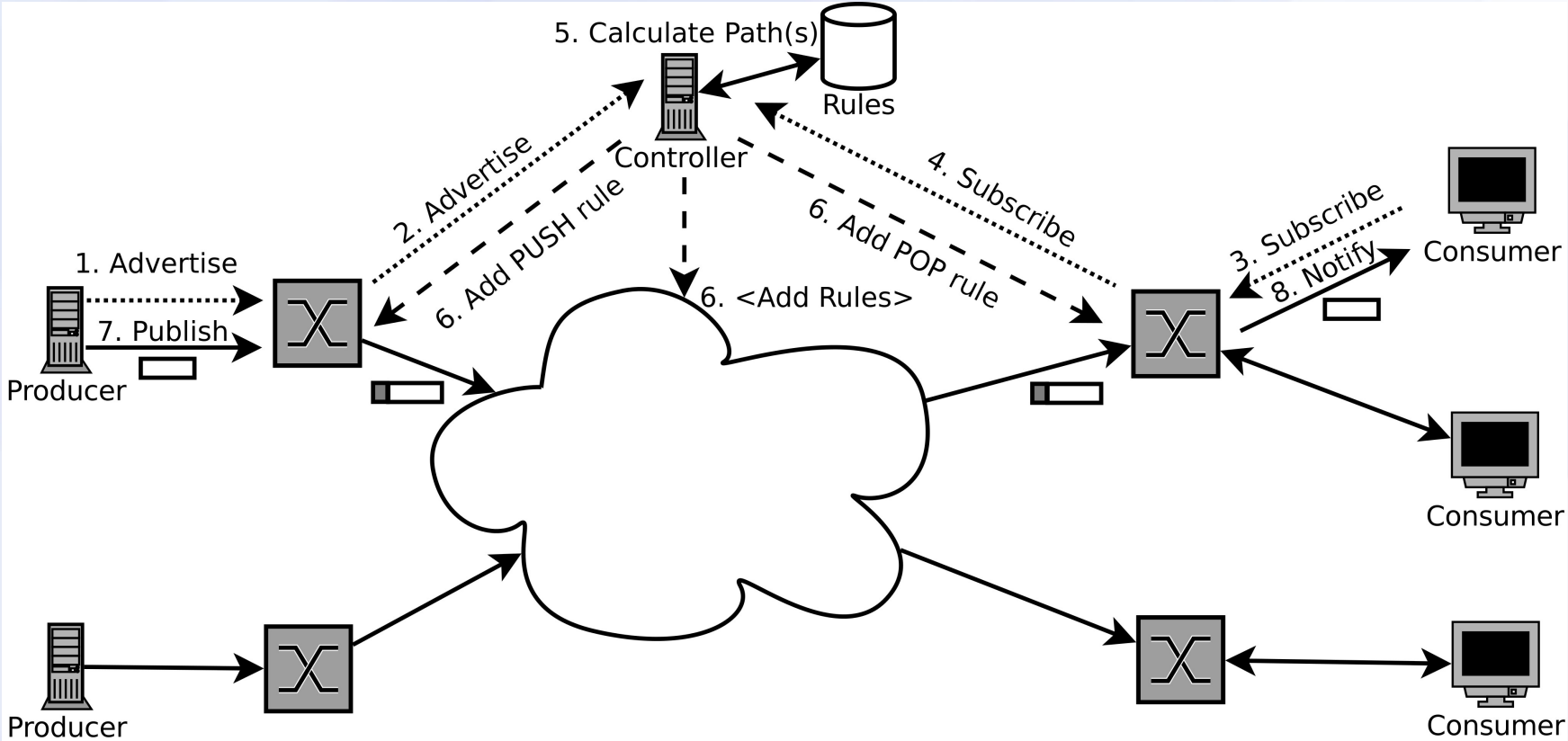
# Background & Motivation

- Many grid apps use Pub-Sub model
- Pub-Sub brokers work at Application Layer
- High overhead in data path due to brokers
- Can we keep data path below Layer 3?
- Grid network assumption: Managed network

# Solution

- Software-Defined Networking! (SDN)
- OpenFlow + MPLS
  - Advertisements & Subscriptions trapped by broker/controller
  - MPLS paths set up in switches
  - Publications labelled at entry switch
  - Fast switching throughout network
  - Labels popped at exit switch

# Architecture



# Implementation

- MiniNet for simulation of flexible topologies
- OpenVSwitch with MPLS extensions
- POX controller
- Custom scripts for managing Adv/Sub/Pub
- Real PMU data packets (IEEE C37.118)

# Issues

- MPLS not supported out-of-the-box by released OpenFlow implementations
- IEEE C.37.118 is client-server, not PubSub
- IPDC and PMUsim are GUI based

# Summary

- Work promised:
  - Is work completed
- Given more time:
  - Use real-time PMU simulation automated over command-line
  - Compare performance on live test scenario with existing PubSub systems