Software Defined Networking-based Vehicular Adhoc Network with Fog Computing

N. B. Truong, G. M. Lee and Y. Ghamri-Doudane, 2015 IFIP/IEEE International Symposium on Integrated Network Management (IM),

Introduction

- Vehicular Adhoc Network (VANET) has been facing many difficulties in deployment and management because of the current architecture.
- This paper proposed a new VANET architecture called **FSDN**, which combines SDN and fog computing as a solution.

VANET

- Vehicular Adhoc Network
  - High mobility nodes (vehicles)
  - Each node communicate with other vehicles, base station, and Road-Side-Units (RSU) using different radio transceiver.
  - RSUs connect to RSU control station (RSUC) for data storage and processing

VANET (cont.)

● Challenges:
  ○ Resources utilization
  ○ Unbalanced flow traffic
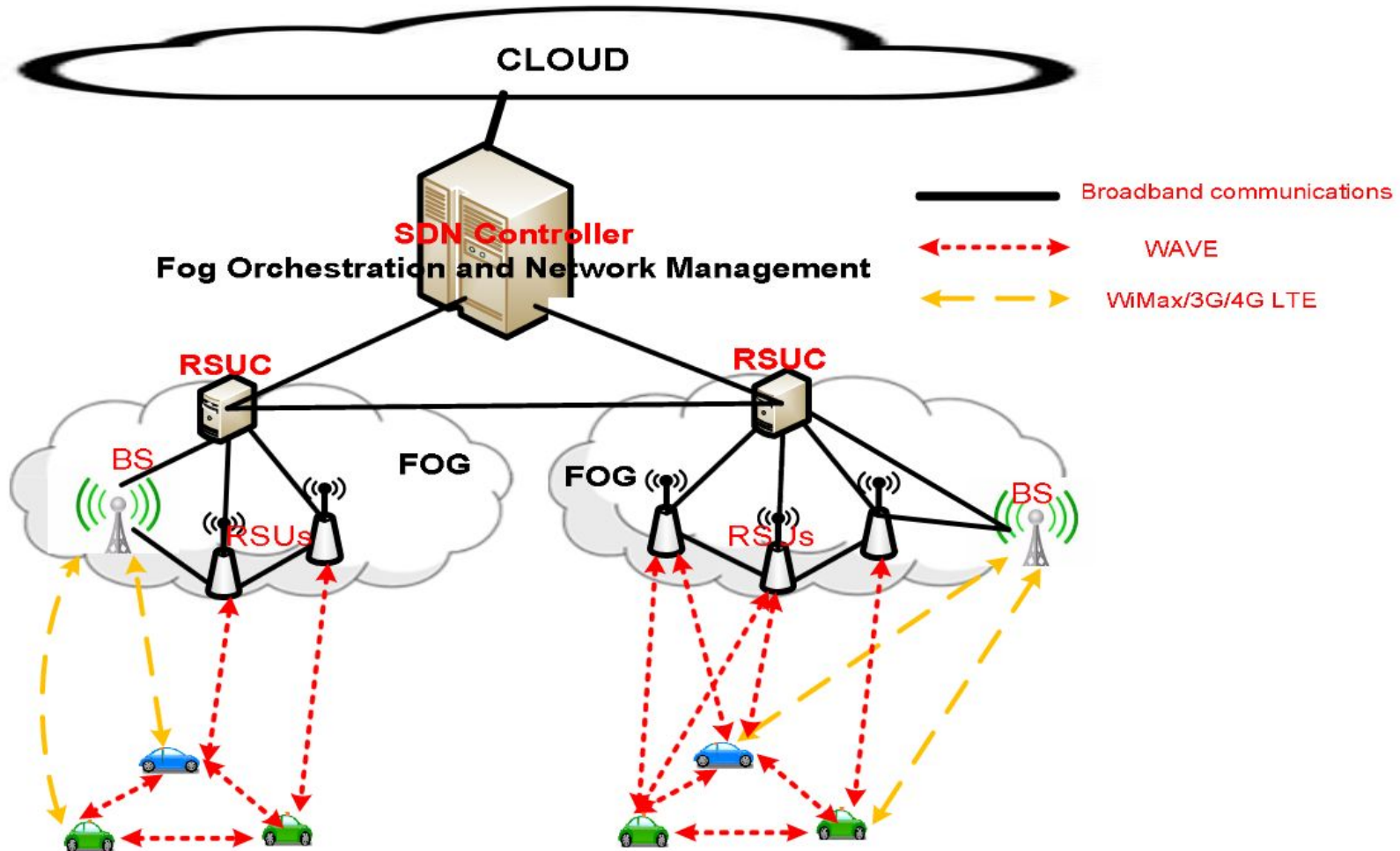 ○ Delay constraint
 ○ QoS
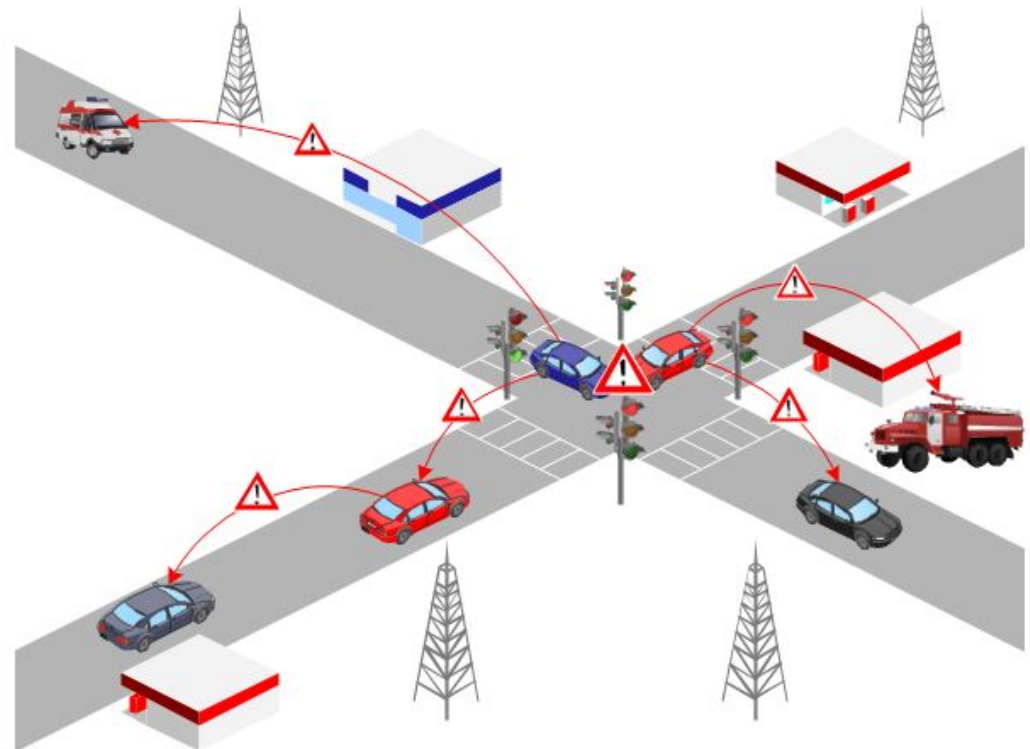
SDN-based VANET

- **Architecture**
  - SDN Controller
    - As fog orchestration and resource manager
  - SDN Road-Side-Unit Controller (RSUC)
  - SDN Road-Side-Unit
  - Cellular Base Station (BS)
    - As fog devices
  - SDN Wireless Nodes
    - As end users

SDN-based VANET (cont.)

FSDN VANET Operations

- SDN Controller **does not take full control** of the system.
  - Sending "policy rules" to BSs and RSUCs
- Data was gathered by BSs and RSUs will be send to the cloud through SDN controller.
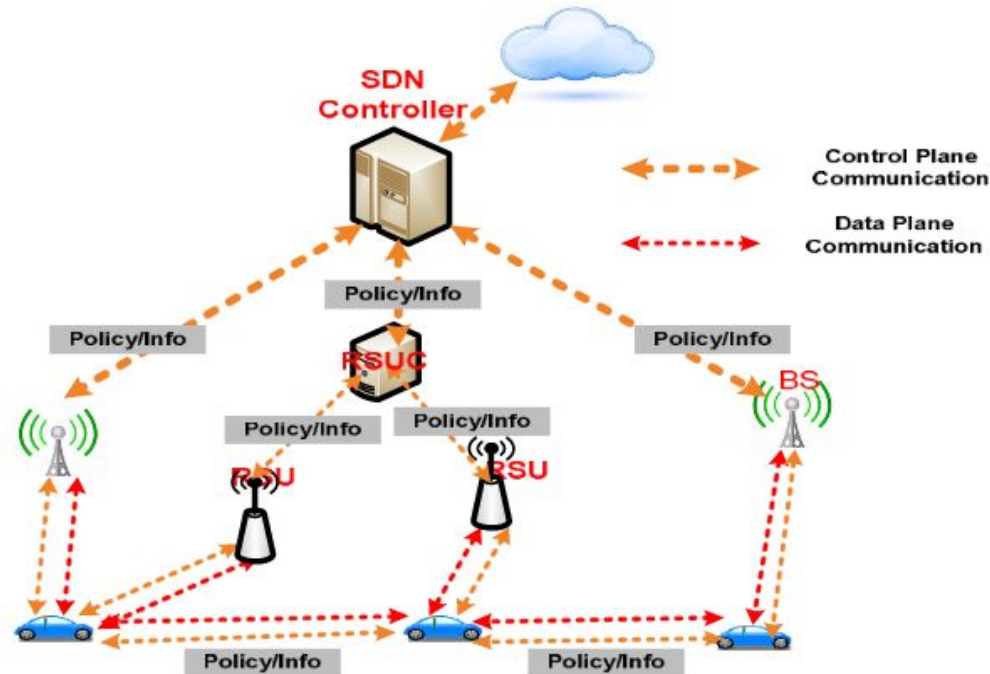
FSDN VANET Operations (cont.)

- Offer virtualization for enabling fog services at SDN Controller and fog devices.
    - Services are hosted at VMs
    - Allow service migration and replication

- Using Service-Oriented Resource Sharing model.
    - SDN Controller coordinate tasks and resources
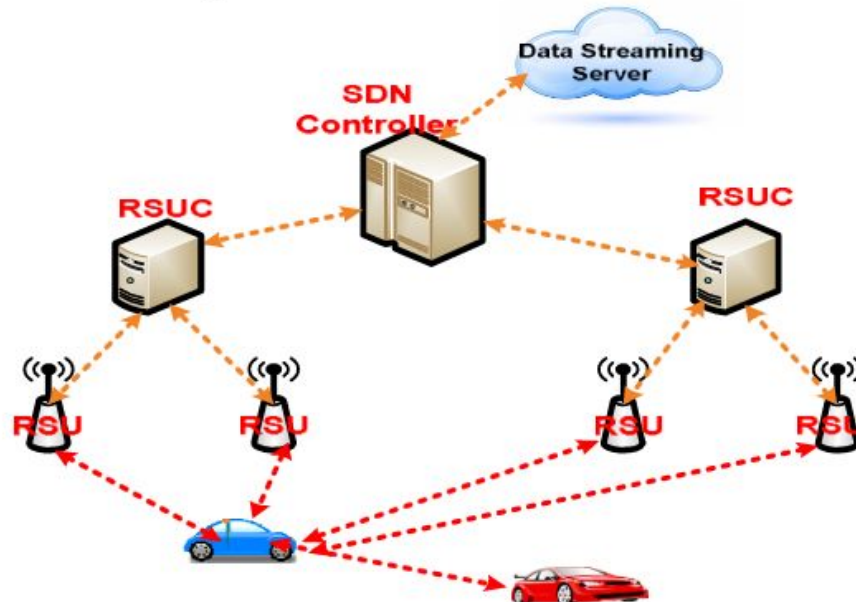
SDN-Controller Components
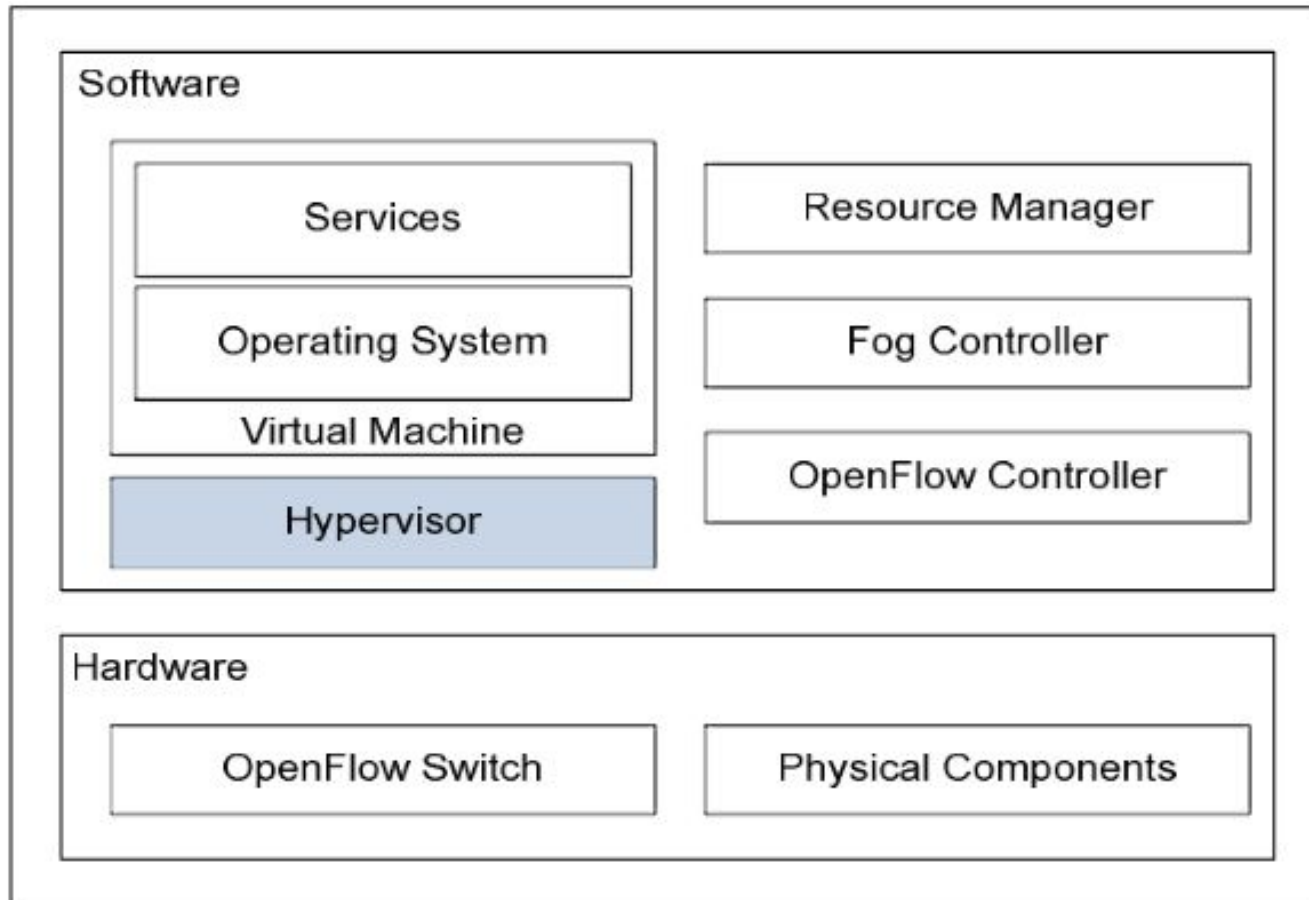
Use Cases

- Data streaming
- Lane-Change service

Data Streaming

- Distribute data in low delay requirement, where the network is high mobility and topology changes.
- Advantages compare to traditional VANET:
  - Optimize configuration for the service deployment
  - Dynamically adapt to topology changes and reconfigure

Conclusion

- This paper present a system that combine SDN and fog computing technology, to improve the performance of VANET.

- How the policy rules work?
- Evaluation?