

# DetNet Requirements on Data Plane and Control Plane

[draft-zha-detnet-requirements-00](#)

Yiyong Zha, Liang Geng

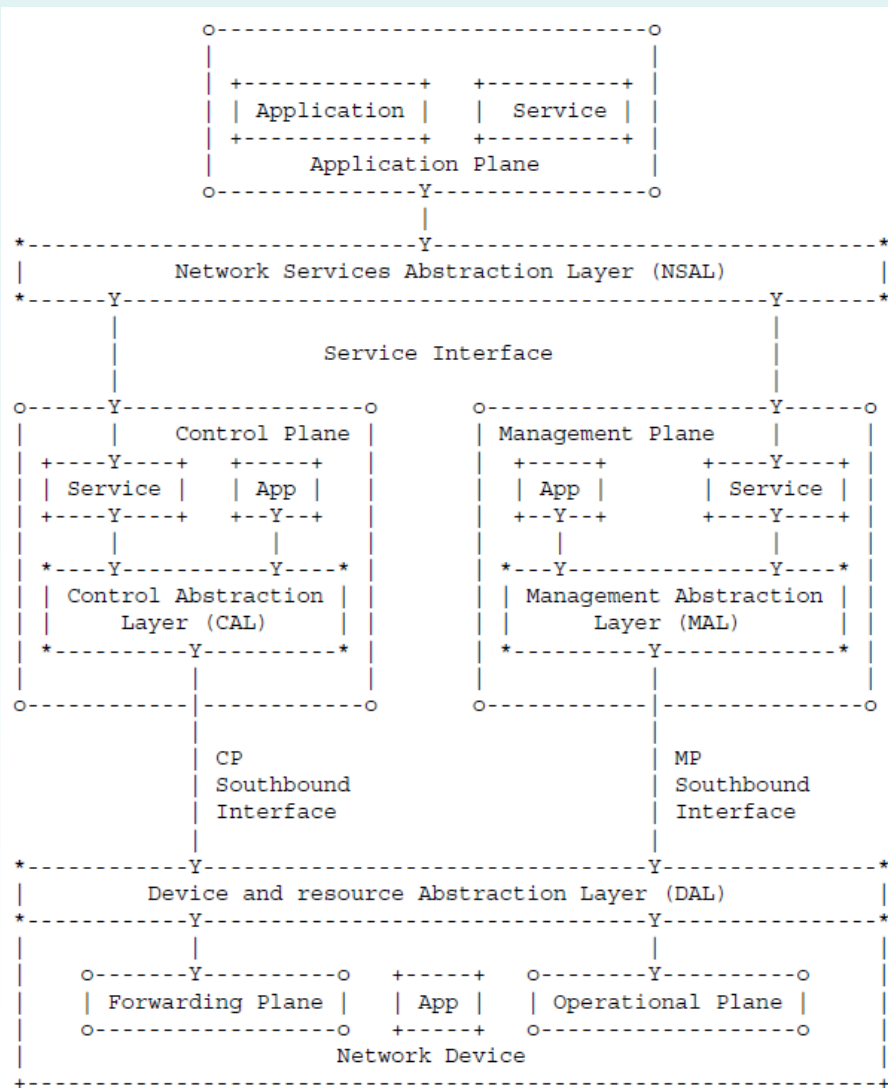
---

# Agenda

---

- **DetNet Architecture**
- Data Plane Design Requirements
- Control Plane Design Requirements
- DetNet Modeling
- Synchronization and OAM

# DetNet Architecture



- DetNet Architecture

- Service Layer- Deploy DetNet service
  - Service model
- Control Plane – manage DetNet network
  - Controller or protocols
  - Interfaces
- Data Plane – manage devices
  - Multi-vendor NEs
  - Queuing, shaping, scheduling

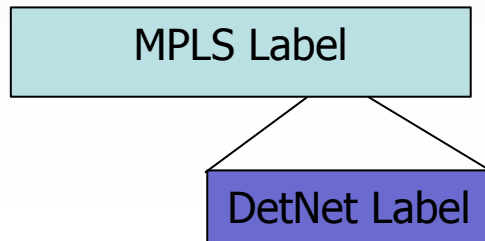
# Agenda

---

- DetNet Architecture
- **Data Plane Design Requirements**
- Control Plane Design Requirements
- DetNet Modeling
- Synchronization and OAM

# Use MPLS to Support DetNet

- MPLS
  - Existing Layer-2.5 technique to support any network protocol
- DetNet over MPLS
  - Setup Label Switched Path (LSP) for DetNet flow with label definition and QoS mapping.
  - Latency-aware LSP installment and removing
  - Supporting Layer-2 techniques such as pseudowire
  - ***Latency –aware MPLS ?***



# Flow Identification

---

- How to differentiate DetNet from BE flow
  - Tuple matching approach (VLAN, MAC, Src) is not applicable
  - Do proxy or transformation
  - Unique flow ID in the network
- How to differentiate multiple delay requirements
  - QoS mapping mechanisms
  - Service model with delay information

# Deterministic Forwarding

---

- TSN is good candidate
  - Frame preemption (IEEE 802.1Qbu)
  - Time aware shaping (IEEE 802.1Qbv)
- Standard queuing, shaping, transmission selection mechanisms
  - Also related to the southbound interface and configuration model

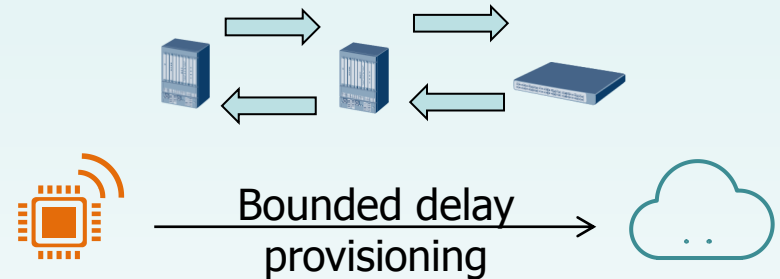
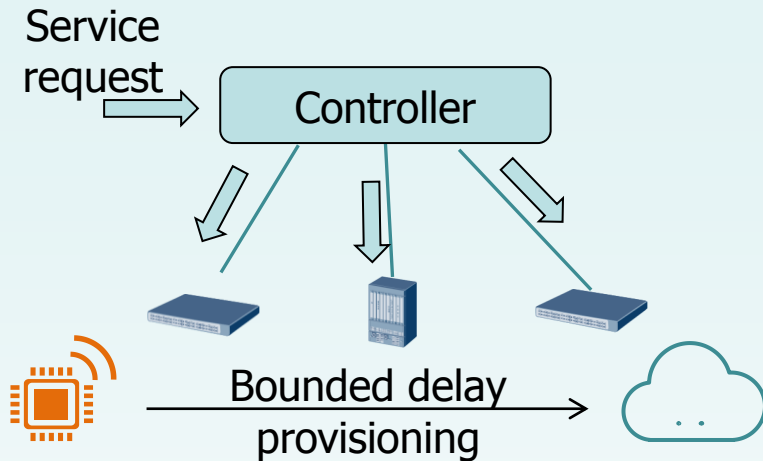
# Agenda

---

- DetNet Architecture
- Data Plane Design Requirements
- **Control Plane Design Requirements**
- DetNet Modeling
- Synchronization and OAM



# Centralized or Distributed Control



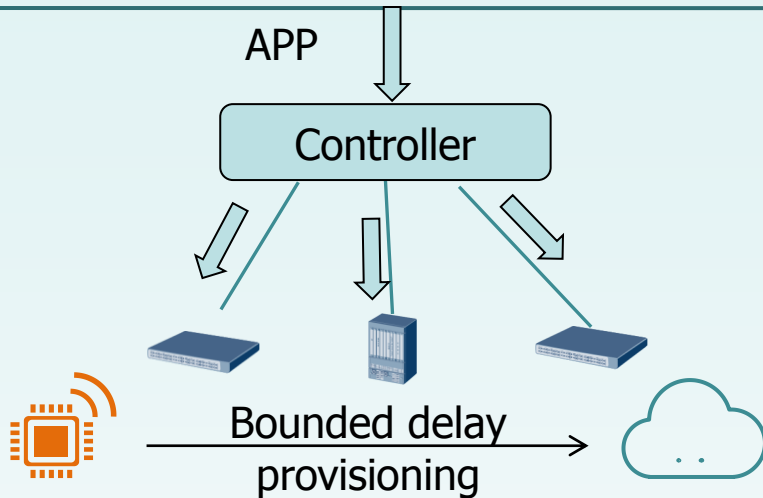
- **Centralized**

- Good for Deterministic service provisioning, OAM
- Existing SDN controller
- Lack of agility

- **Distributed**

- Peer-to-peer protocols to manage multiple devices
- Autonomic negotiation between NEs

# Southbound/Northbound Interface

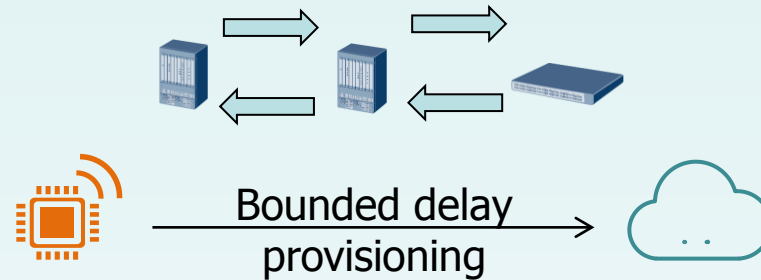


NBI: communications between Apps and controller

SBI: communications between controller and NEs

- Northbound
  - Service level delay requirement
  - Flow and service description, service model
- Southbound
  - Resource inventory, Topology. (Bandwidth e.g.)
  - The data plane information of NEs. (queuing, e.g.)

# Peer-to-Peer Reservation Protocol



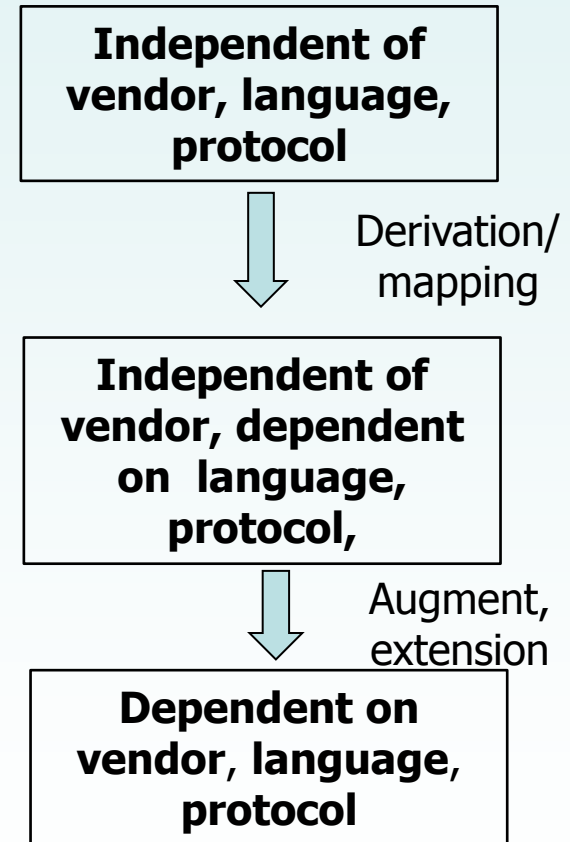
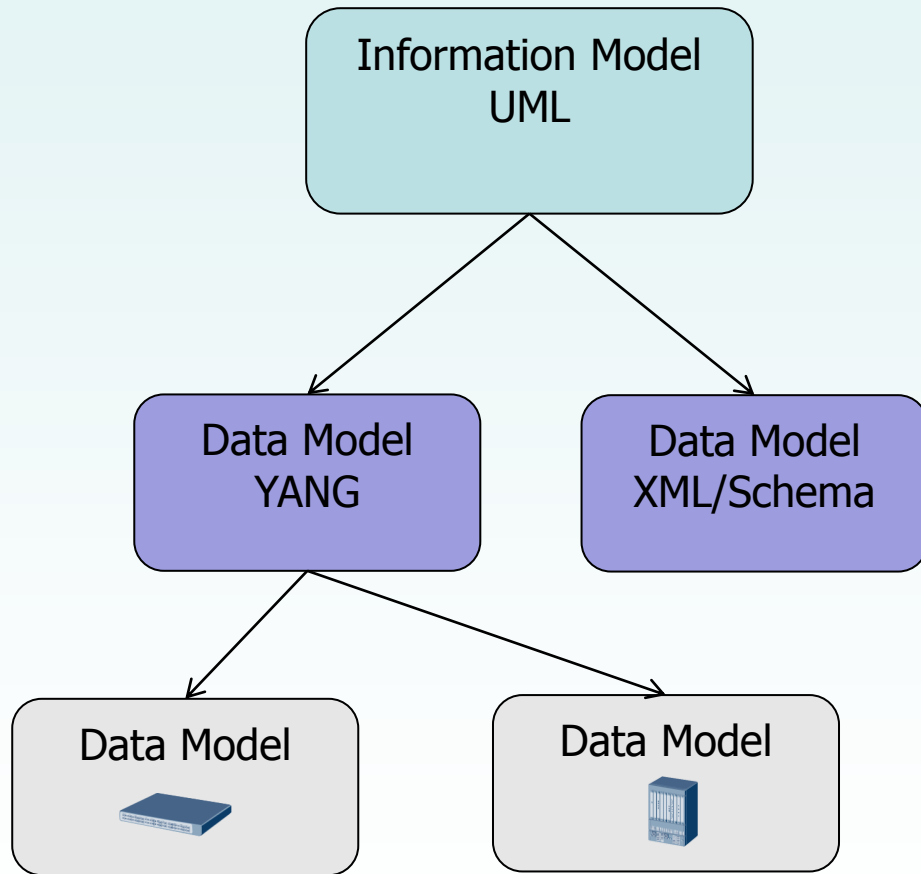
- Peer-to-Peer Reservation Protocol
  - Good for sensor network, IOT, lightweight comm.
  - “Tell and go”: One way reservation, maybe?
  - Easy to be utilized via MPLS
  - RSVP-TE is not feasible
- Depending on the how to describe DetNet flow
  - Flow modeling, (time aware, application aware)

# Agenda

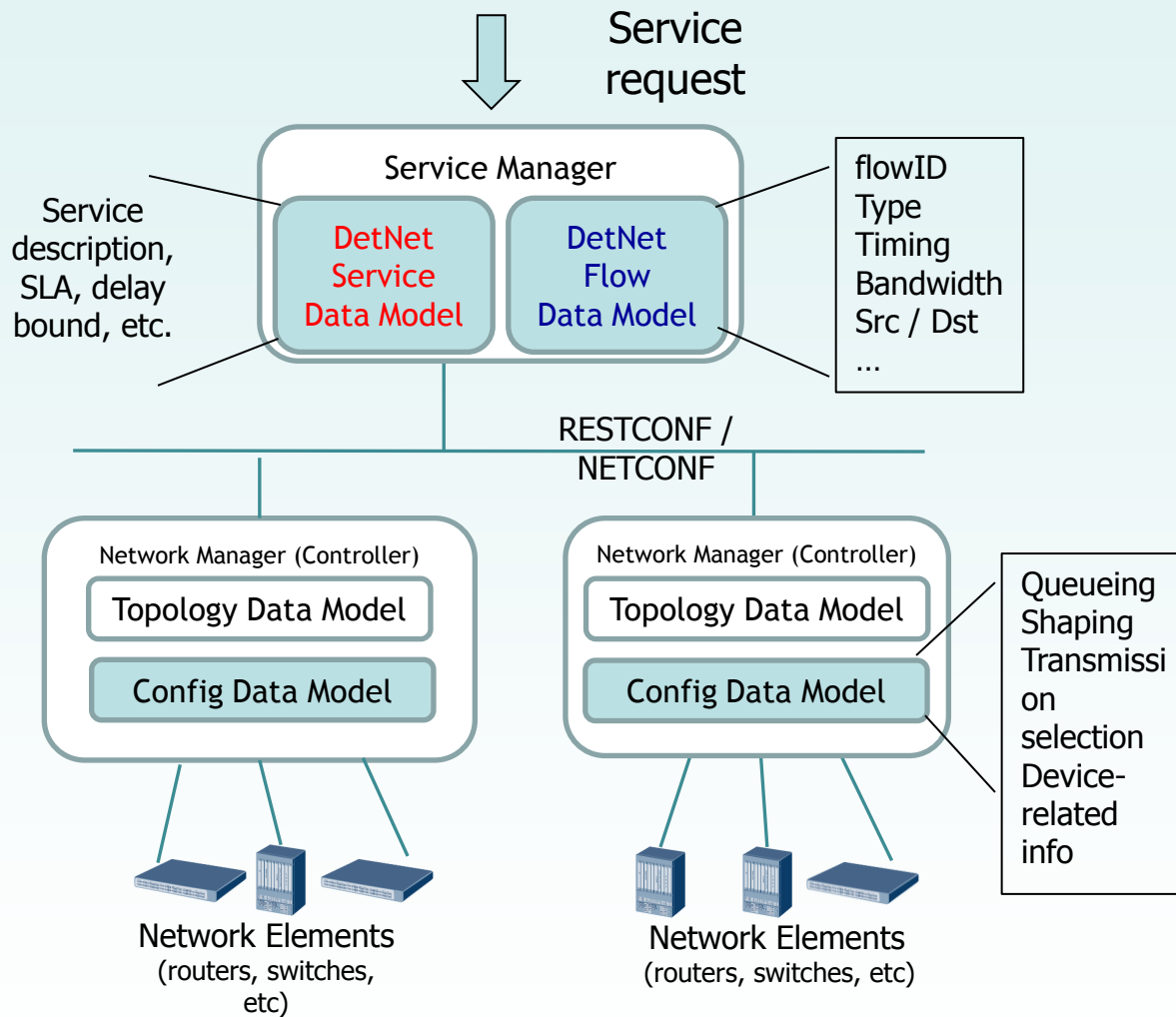
---

- DetNet Architecture
- Data Plane Design Requirements
- Control Plane Design Requirements
- **DetNet Modeling**
- Synchronization and OAM

# Modeling of DetNet



# Service / Configuration Model



- Service model to deploy service
  - L3VPN
  - DetNet service ?
- Configuration model to config device
  - Config queuing
  - Config shaping
  - .....
- Flow model
  - Dependent on config model
  - Related to service model

# Agenda

---

- DetNet Architecture
- Data Plane Design Requirements
- Control Plane Design Requirements
- DetNet Modeling
- **Synchronization and OAM**

# Time Synchronization & OAM

---

- Time synchronization
  - Time aware shaper is good for LAN and Ethernet
  - Time sync is necessary for multi-hop networking
  - Absolute end-to-end delay bound requires time sync
- OAM
  - Latency measuring
  - Congestion control
  - Device failure



# Questions?



Questions?