

Supporting SDN in Transport Network

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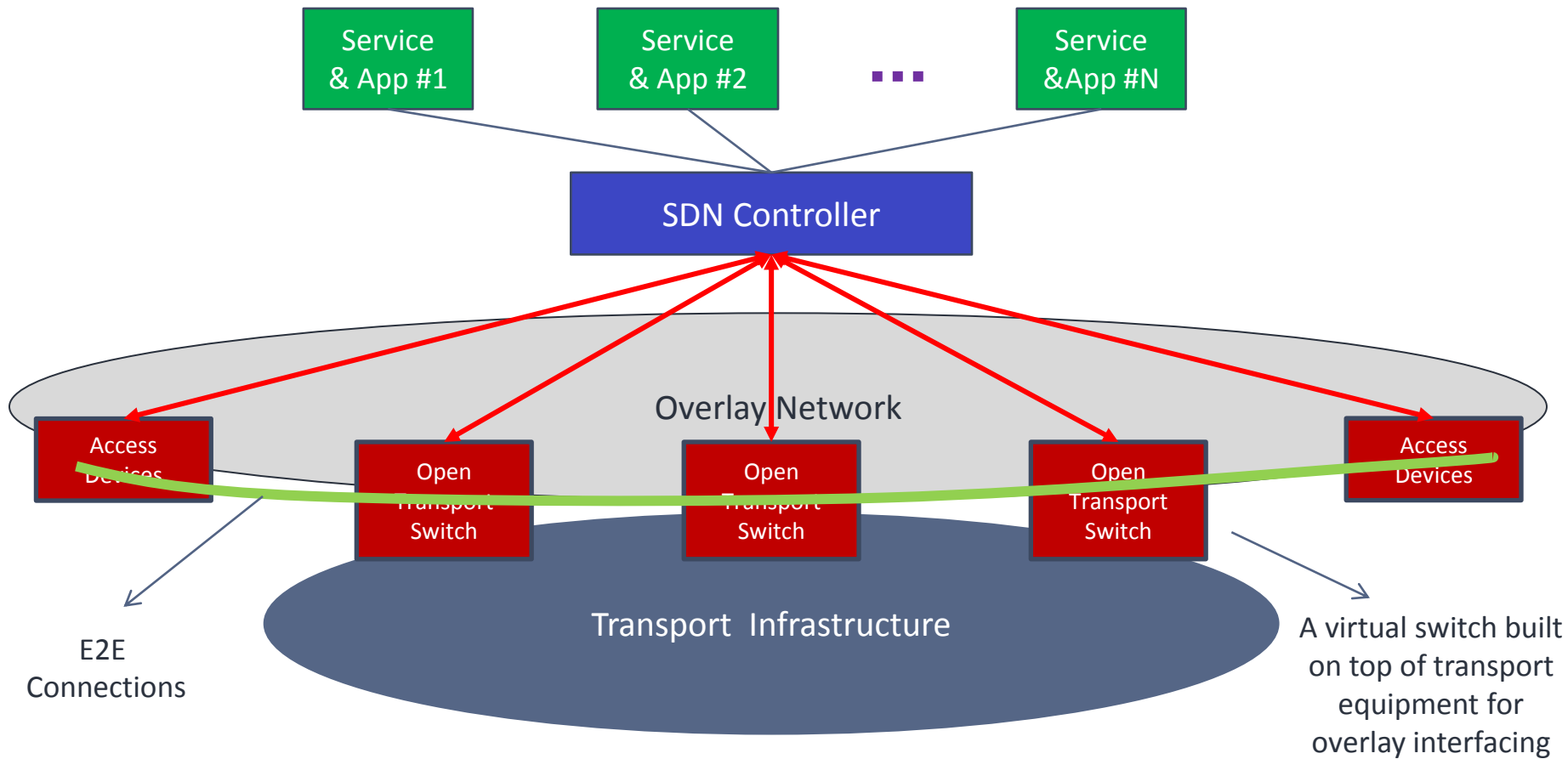
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Problems in Transport Networks

1. Typically, transport equipment cannot talk to each other outside one network domain
2. Network operation over multiple layers (including ROADMs, OTN, Ethernet and MPLS) is very expensive
3. Service deployment is very slow (due to technology, operational practice and politics)

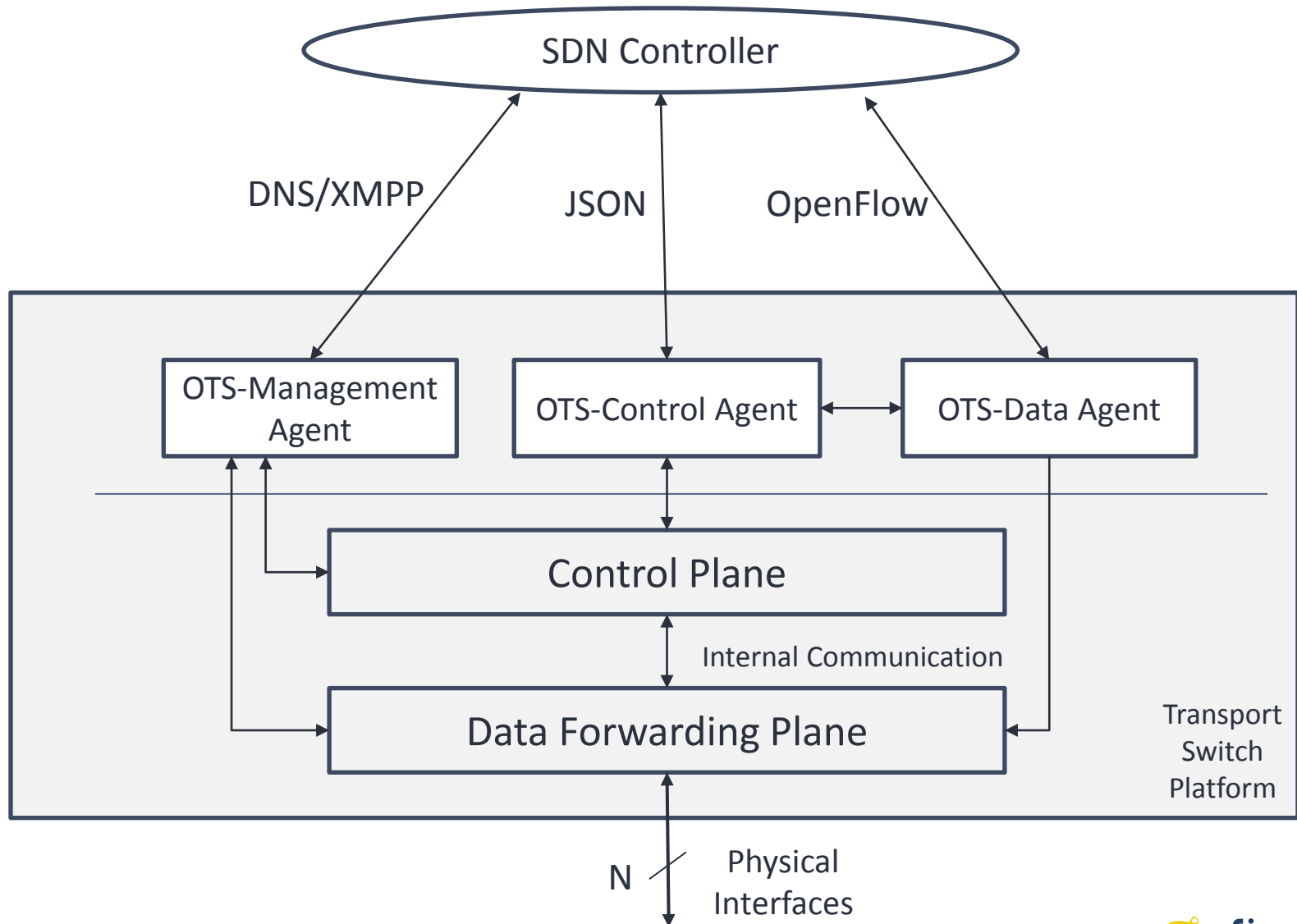
Solution: Use SDN to Build an Overlay



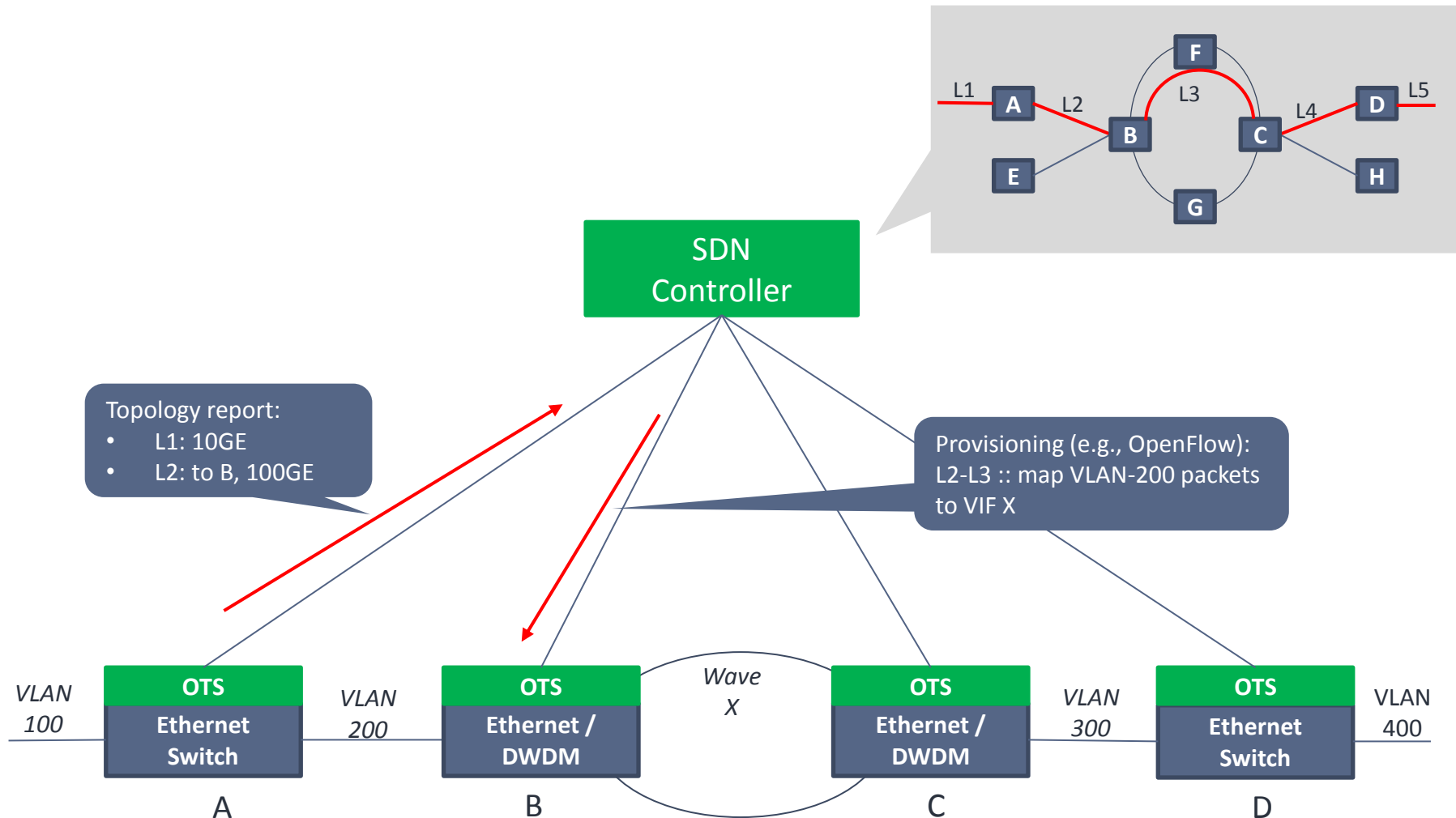
- Build an overlay network on top of transport infrastructure
- Deploy network services on top of the overlay
- Define a common, modular, light-weight interface on transport equipment

Open Transport Switch:

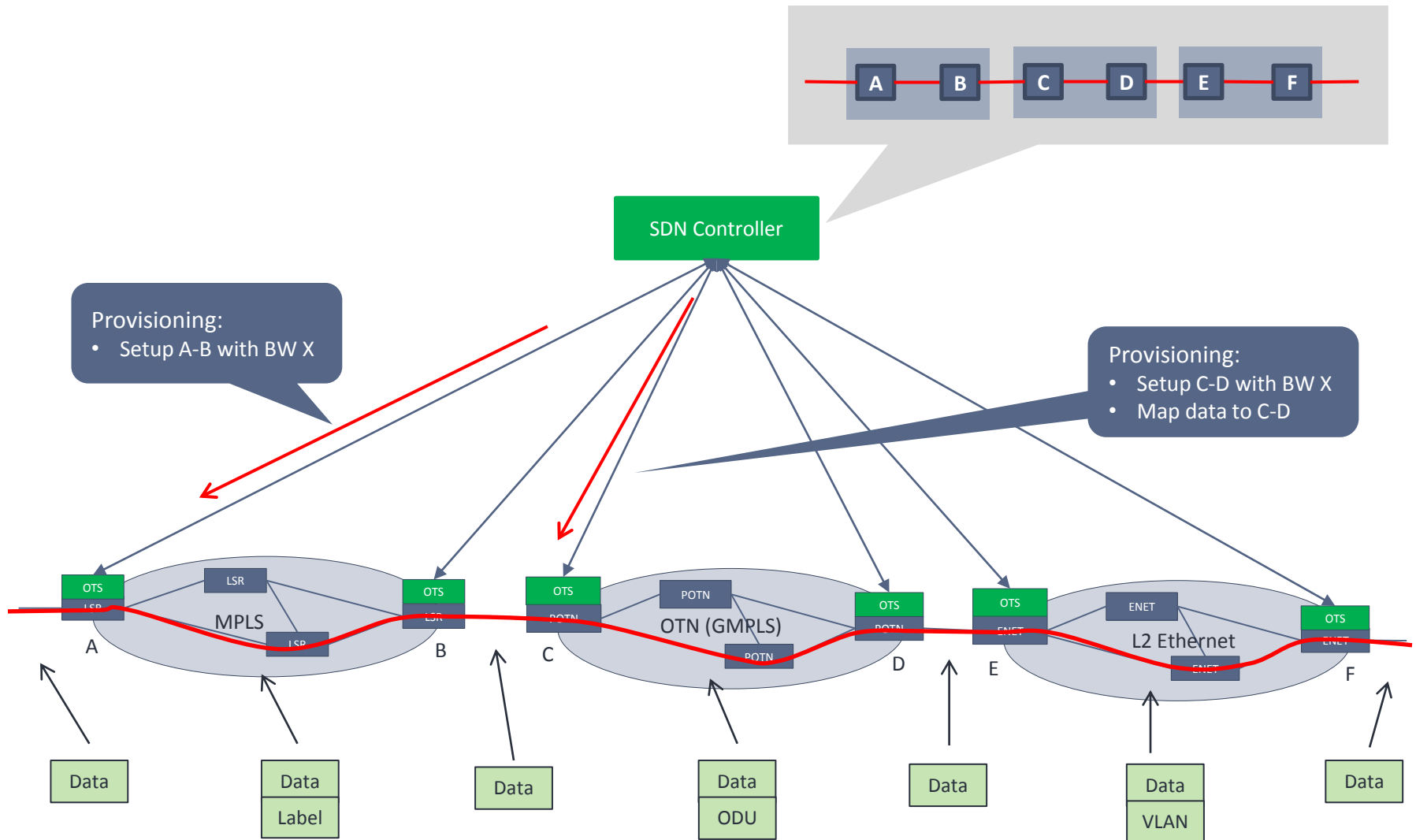
A light-weight virtual switch in transport equipment




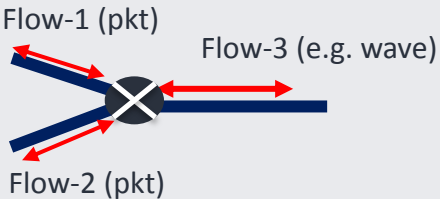
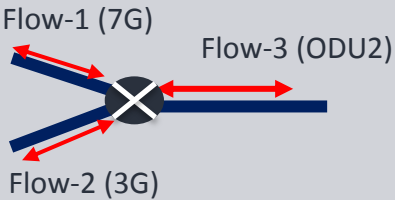

Operation Example #1: Explicit Provisioning



Operation Example #2: Implicit Provisioning



OpenFlow and The Challenges

Functions	Example	Problem	Possible Solution
Cross-connect Setup		Flows are non-packet (e.g. waves); not defined in OpenFlow	Introduce the concept of flow-id into OpenFlow
Flow Aggregation		No such concept in v1.0; virtual port is introduced in v1.0, and is only for Ethernet	Introduce the concept of virtual port for non-packet flows
QoS and CAC		QoS is not in v1.0	Largely solved in v1.3
Implicit provisioning		How can we make flow id's unique?	MPLS Label? VXLAN? 😊

Final Words

- ▶ SDN can speed up service deployment in transport network through network overlay and virtualization
- ▶ Open Transport Switch is a virtual switch installed on transport equipment for SDN Controller to discover, monitor and provision user flows
- ▶ OpenFlow needs to be enhanced to support basic transport network operation
- ▶ We'd like to work with the research community to define and develop Open Transport Switch together