Challenges of Service Provisioning in MPLS OpenFlow

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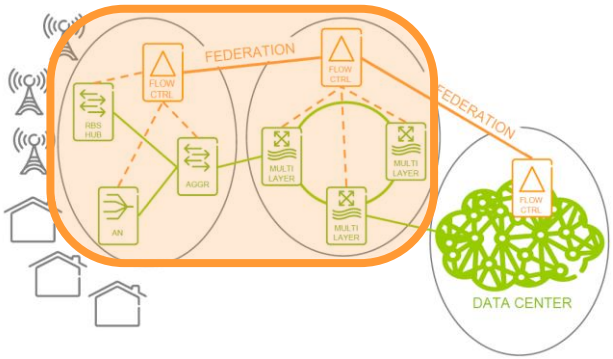
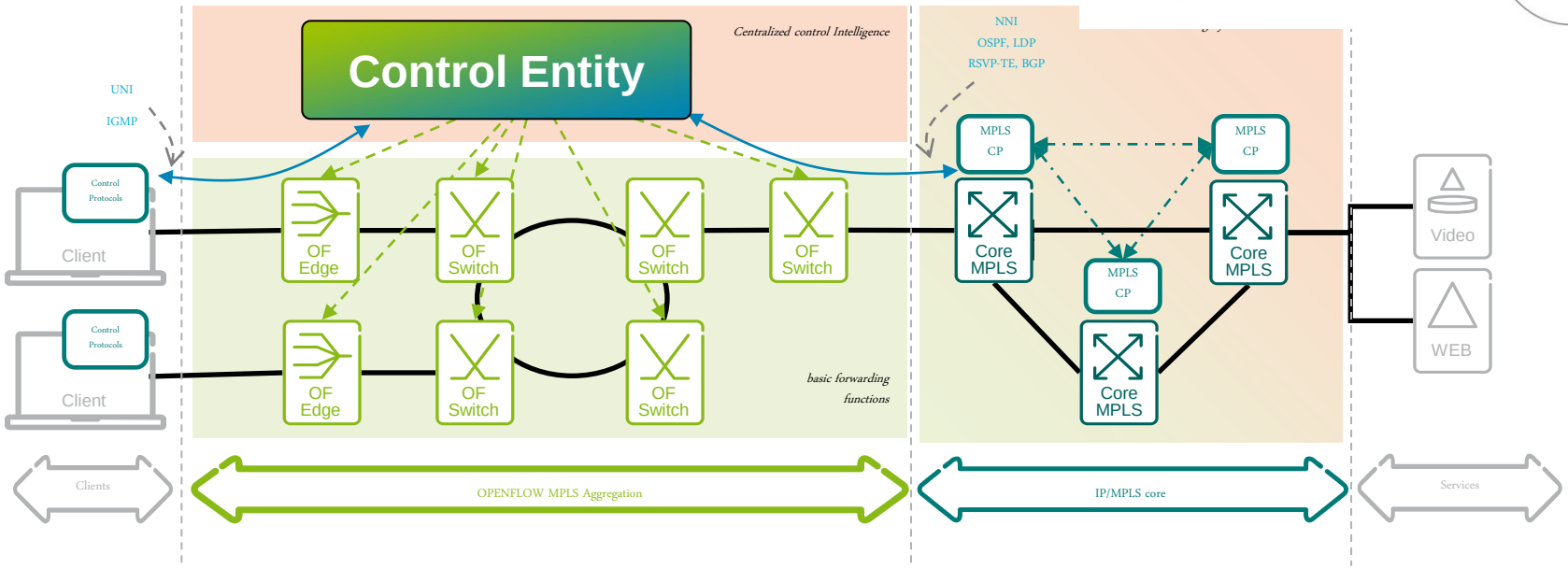
- SPARC aims carrier grade split architectures
- With focus on operators' networks
- OpenFlow as split architecture enabler

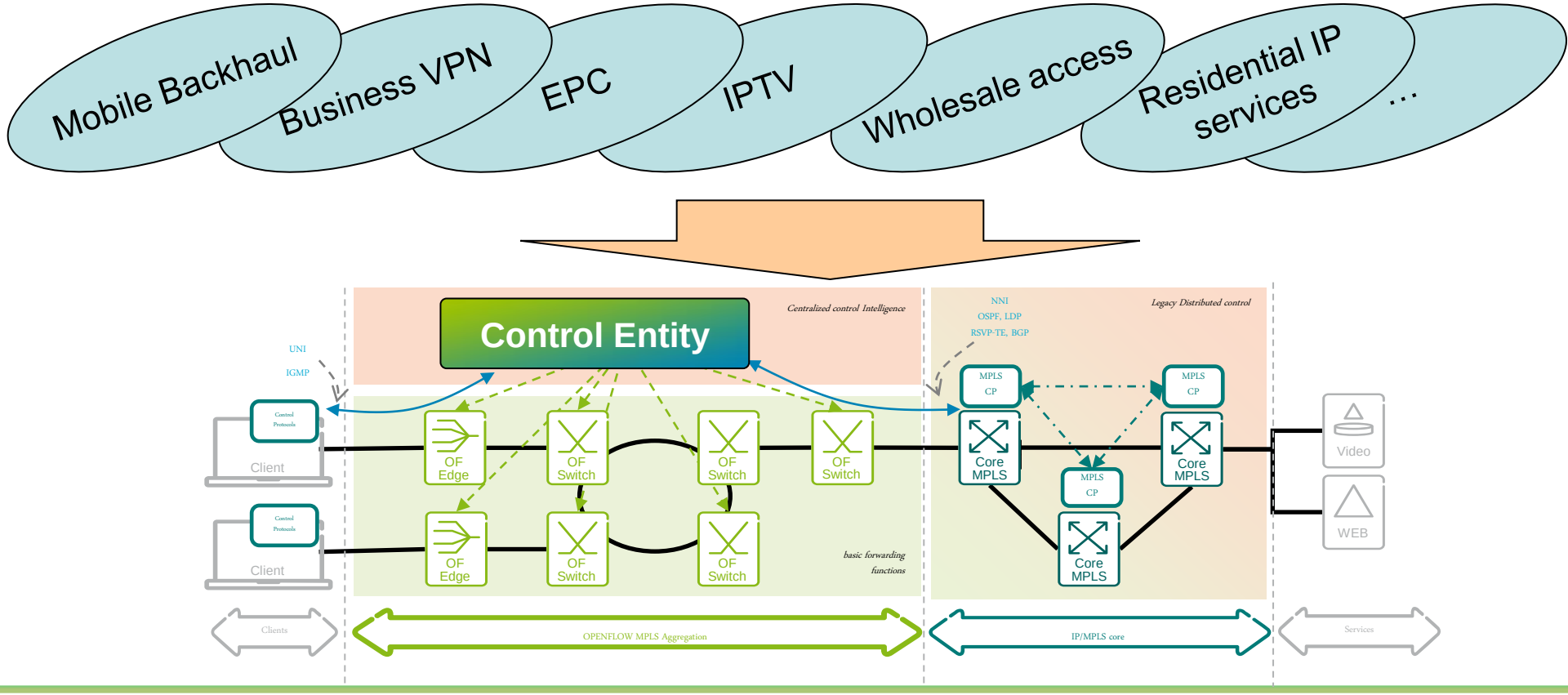




Split control (OpenFlow-MPLS) in acc/agg, interworking with legacy IP/MPLS core

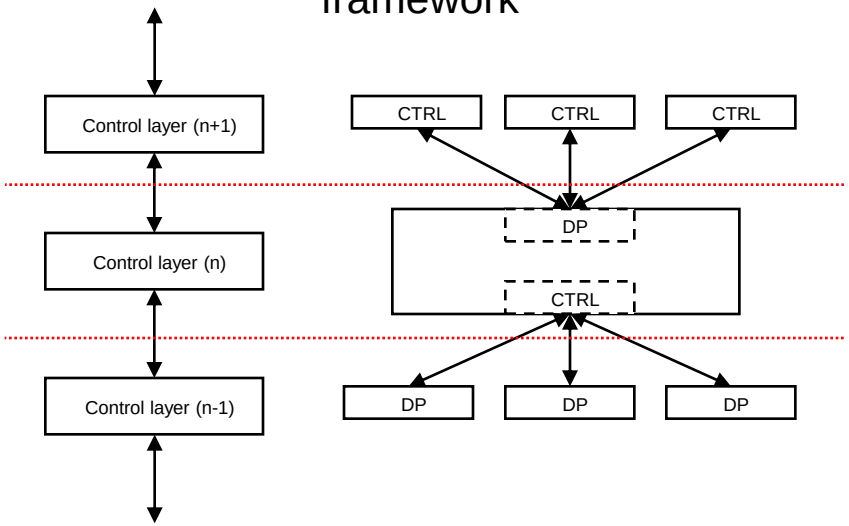
Heterogeneous Services on top of a Homogenous Transport

- Vast number of services
  - Different characteristics, service specific control
  - Service mix can change frequently and rapidly

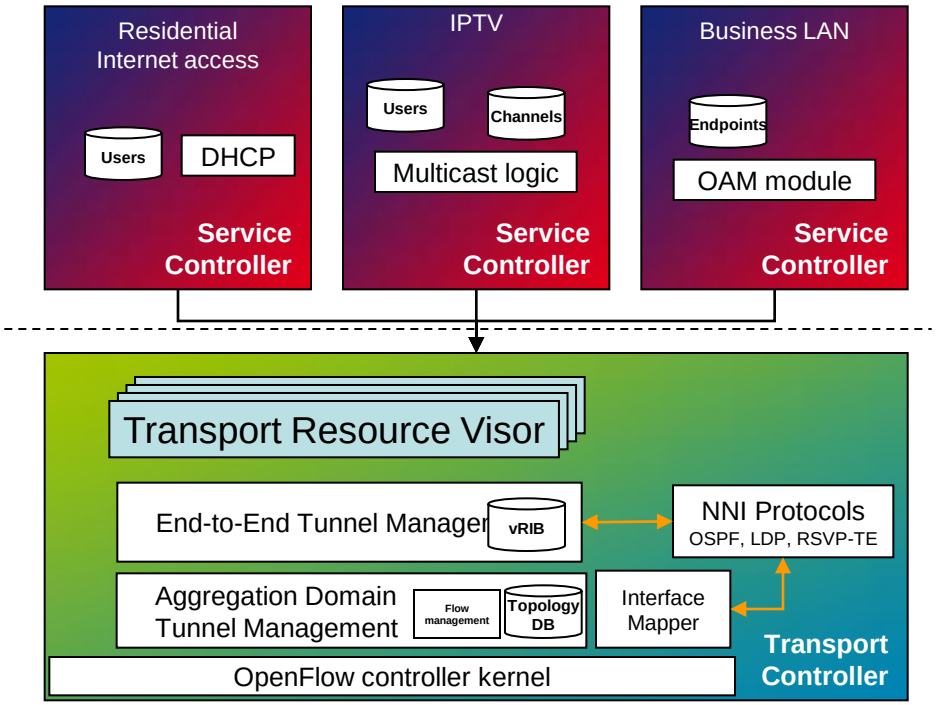


SPARC control framework

Generic controller framework

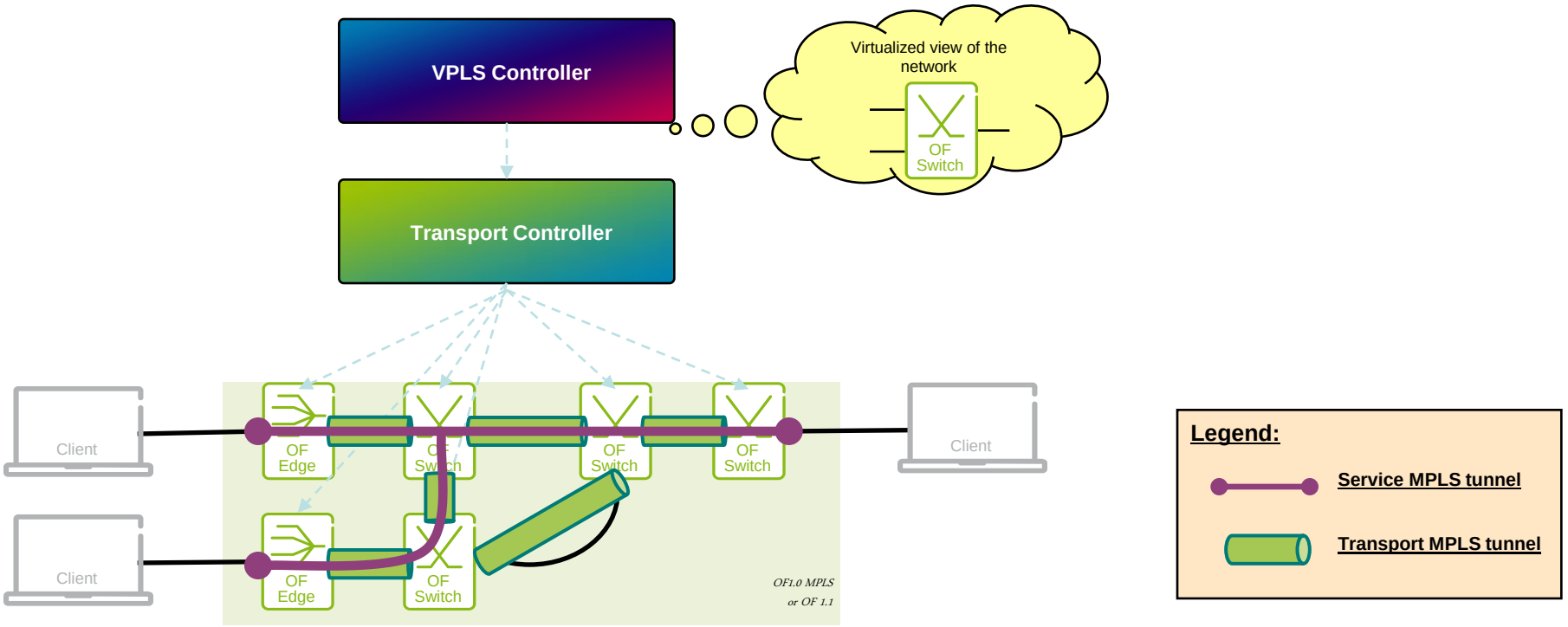


Adapted to our Use-case



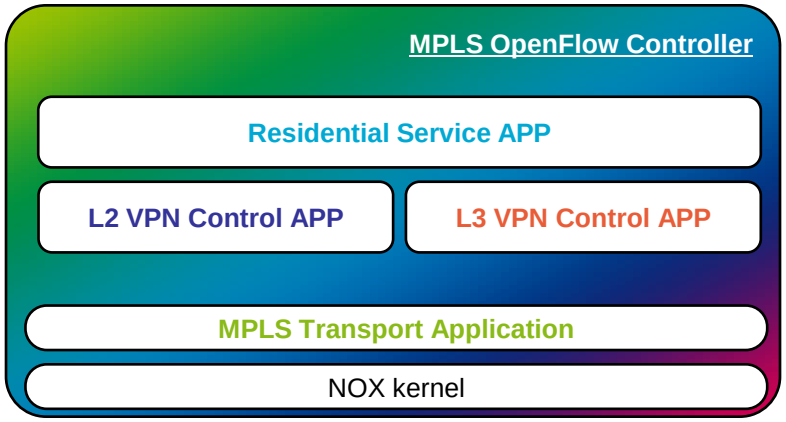
- Hierarchical controller structure
  - Layered control plane, interworking with eachother
  - Recursive Stacking
  - Interfaces

Service example 1: Virtual Private LAN Service (VPLS)

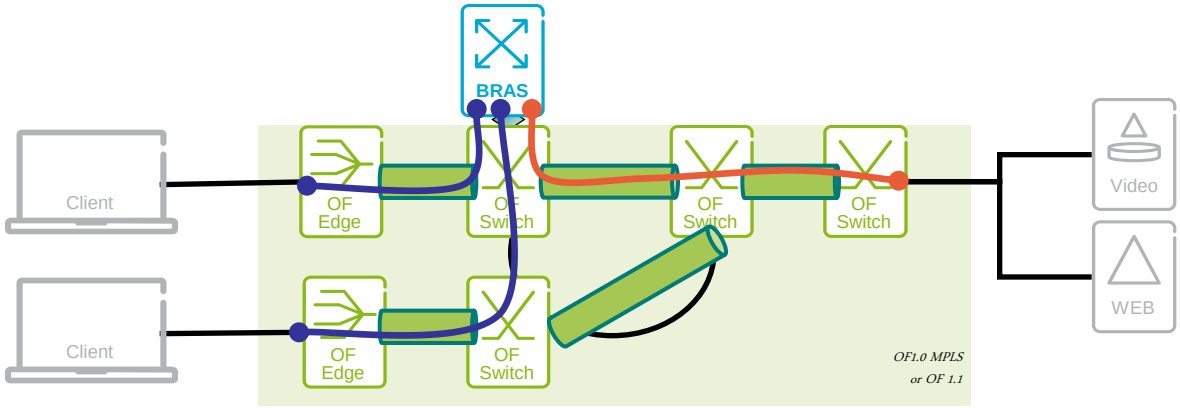


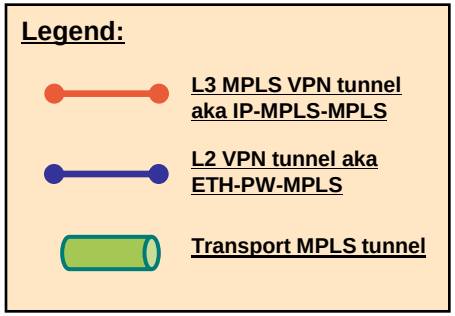
Transport and service are the two mayor layers

Service Example 2: Residential Service with BRAS



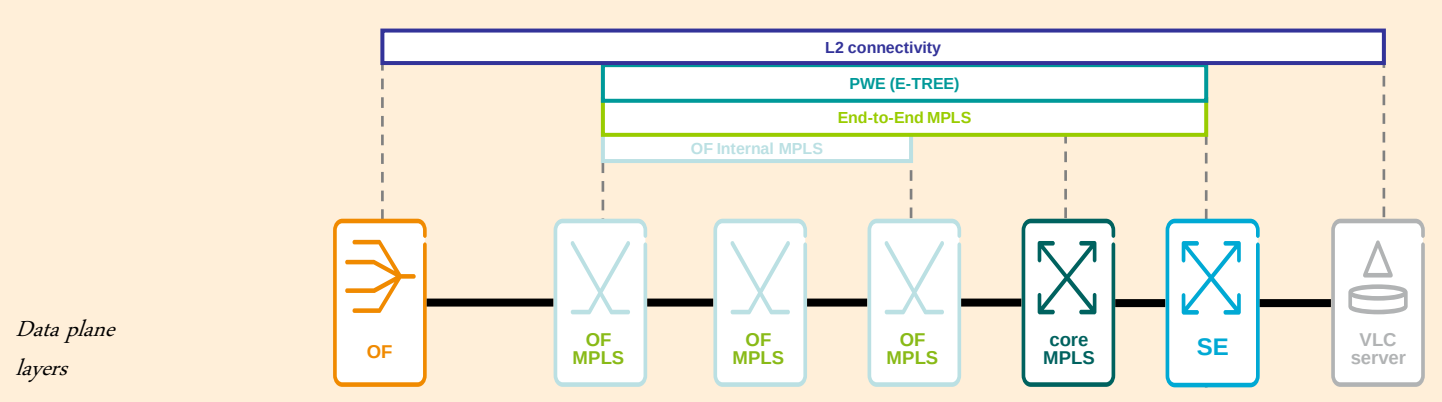
- Broadband Remote Access Server (BRAS) functions include:
  - AAA
  - PPP termination





L2 and L3 type tunnels contribute to the same (higher layer) service

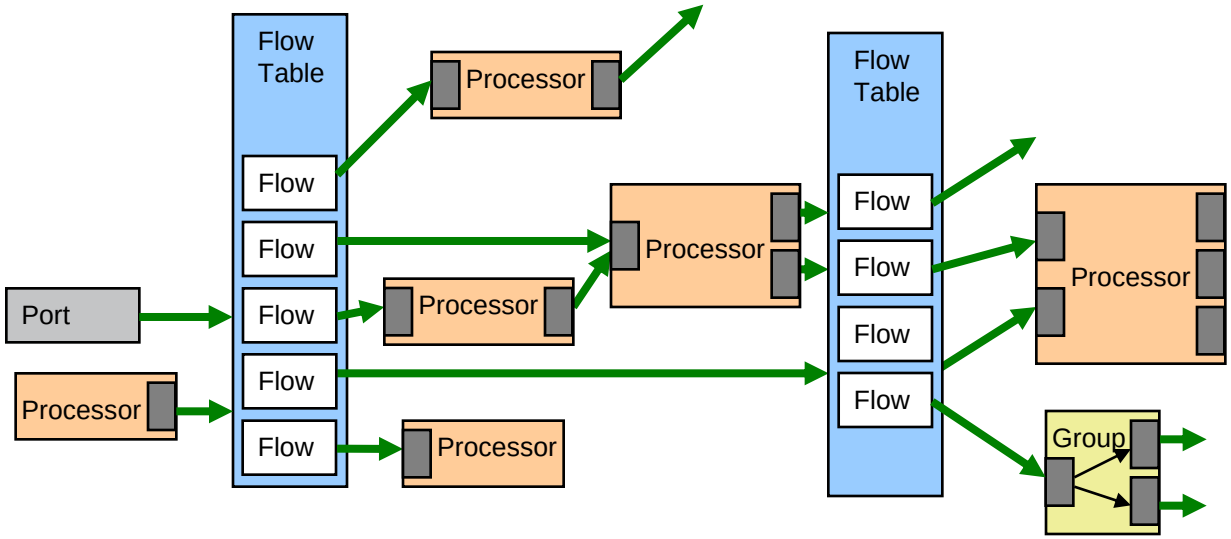
What is missing in standard OpenFlow?



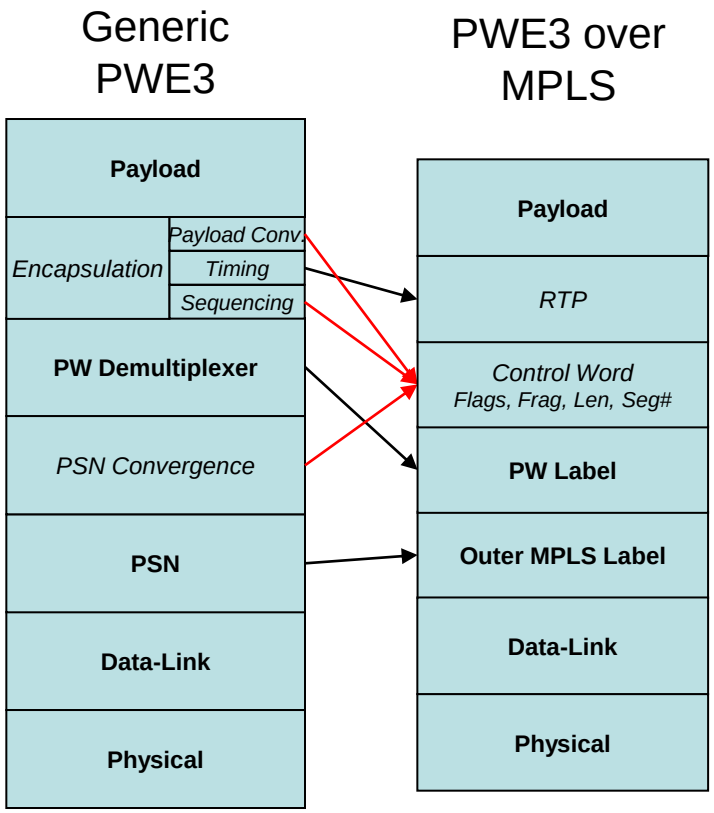
- Flexible encapsulation needed
  - L3 in L2: supported
  - L2 in L3, L2 in L2: not supported
  - L2/L3 connectivity on the top of MPLS → Pseudowire (PWE)
- Stateful processing at endpoints
  - Per packet processing in controller does not scale

OpenFlow protocol extension: Stateful processing and endpoints

- Packet processor
  - Extending the datapath functionality with stateless and stateful packet processing, backward compatible
  - Examples: PW, LLDP, Meters, IPv4 defragmentation, BFD, …

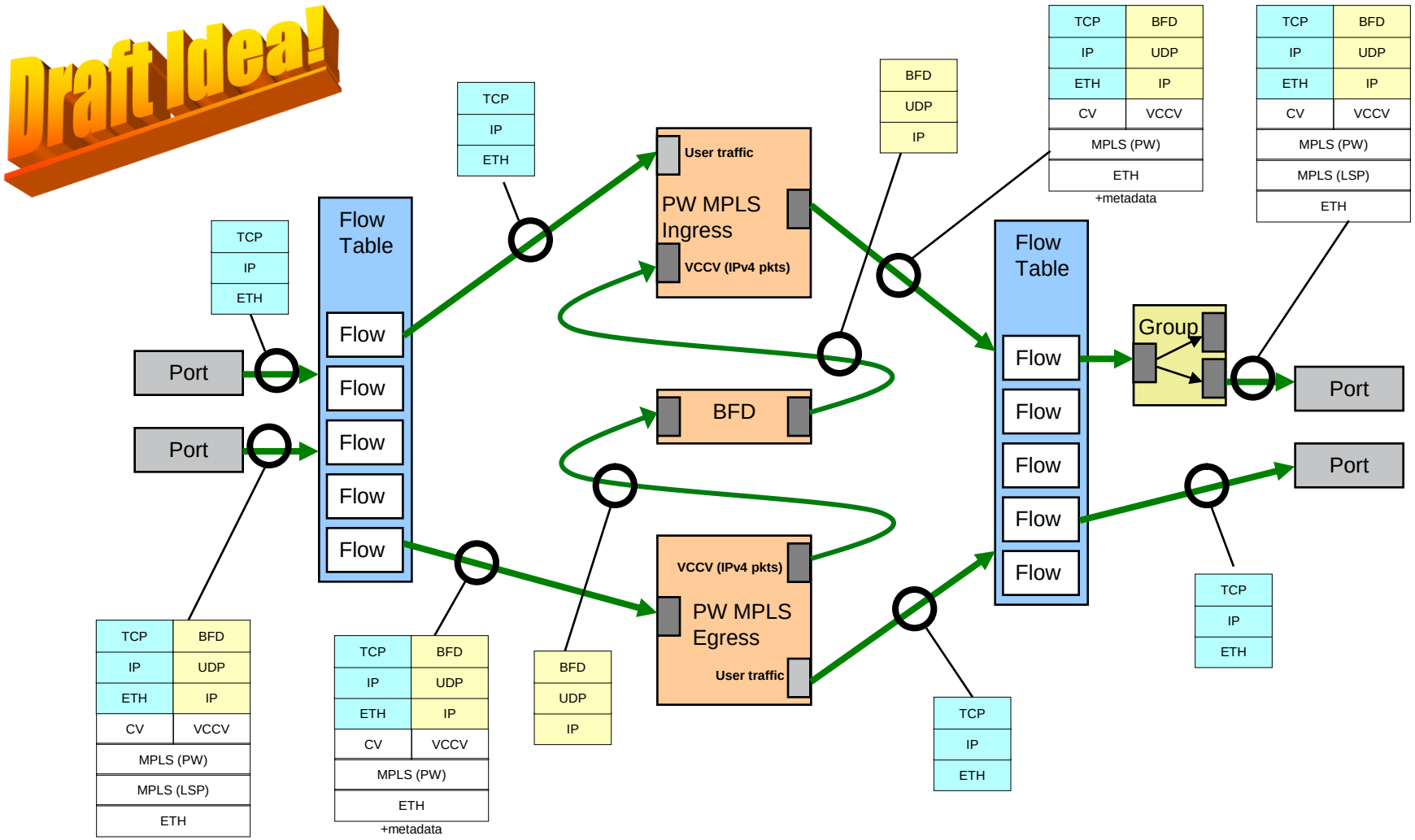


OpenFlow protocol extension: Pseudowires



- To be supported
  - Bottom of stack bit support (match, set)
  - Push/Pop labels/GALS/G-Ach header/control word before Layer 2
  - Ability to POP labels and figure out data type underneath it
  - Ability to process control word and G-Ach header for OAM etc

Example: PW Implementation (with BFD)



Outlook

- Management aspects
  - OAM
  - Network Management System
- QoS
  - OpenFlow support
- Other encapsulation modes
  - PBB
  - GRE

Thank you for your attention!