

Some OpenFlow Details

Multiple Table Example: Port Based VLAN Tagging

- Most NICs don't handle VLAN tags
 - Packets are sent untagged
- VLAN tags are inserted at the first hop switch
 - Based on the source port
- Implementing with one table results in a combinatorial explosion
 - With one table: $N_{\text{port}} \times N_{\text{MAC}}$
 - With two tables: $N_{\text{port}} + N_{\text{MAC}}$

Example: 48x1G Down, 4x10G Up

Rules

Actions

Switch Port	MAC src	MAC dst	Eth type	VLAN ID	IP Src	IP Dst	IP Prot	TCP sport	TCP dport
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Table 0:	7	*	*	*	0	*	*	*	*	*	Push VLAN ID 42; Send to Table 1
Table 1:	*	*	M1	*	42	*	*	*	*	*	Packet out Port 2
	*	*	M2	*	42	*	*	*	*	*	Packet out Port 4

Group Table Detail

Group Table: A table supporting entries with *action buckets*, which can be executed all or in part depending on the group type

Group Table Entry:

Group Identifier	Group Type	Counters	Action Buckets
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- ❑ Group identifier: 32 bit integer identifying the group on the OpenFlow switch
- ❑ Group type: a type identifier defining the group semantics
- ❑ Counters: for tracking group statistics
- ❑ Action Buckets: an ordered list of action buckets, where each bucket contains a set of actions and associated parameters that are always executed as an action set.

Action Bucket Semantics

- Indirect
 - Execute the one bucket in this group
 - Only a single bucket
 - Allows multiple flow entries to point to a single group
 - Example use: IP next hop forwarding
- All
 - Execute all buckets in the group
 - Example use: broadcast or multicast
- Select
 - Execute one bucket in the group
 - Bucket selected through a switch-specific algorithm
 - Example use: Equal Cost MultiPath (ECMP) forwarding
- Fast Failover
 - Execute the first live bucket in the group
 - Allows switch to change forwarding without contacting the controller
 - Switch must implement a liveness mechanism
 - Example use: fast failover

Meter Table Details

Meter Table: a collection of per flow meters used for rate limiting that can be combined with Queues to implement QoS strategies

Meter Table Entry:

- ❑ Meter identifier: 32 bit unsigned integer identifying this meter
- ❑ Meter bands: unordered list of bands, where each band specifies a rate and a processing method
- ❑ Counters: keep track of number of packets processed by this meter

Meter Identifier	Meter Bands	Counters
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Band Entry:

- ❑ Band type: defines how the packet is processed
- ❑ Rate: lowest rate at which the band can apply
- ❑ Counters: keep track of the number of packets processed by this band
- ❑ Type specific arguments: optional arguments depending on type

Band Type	Rate	Counters	Type specific arguments
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