



# Using the OpenDaylight BGP Speaker

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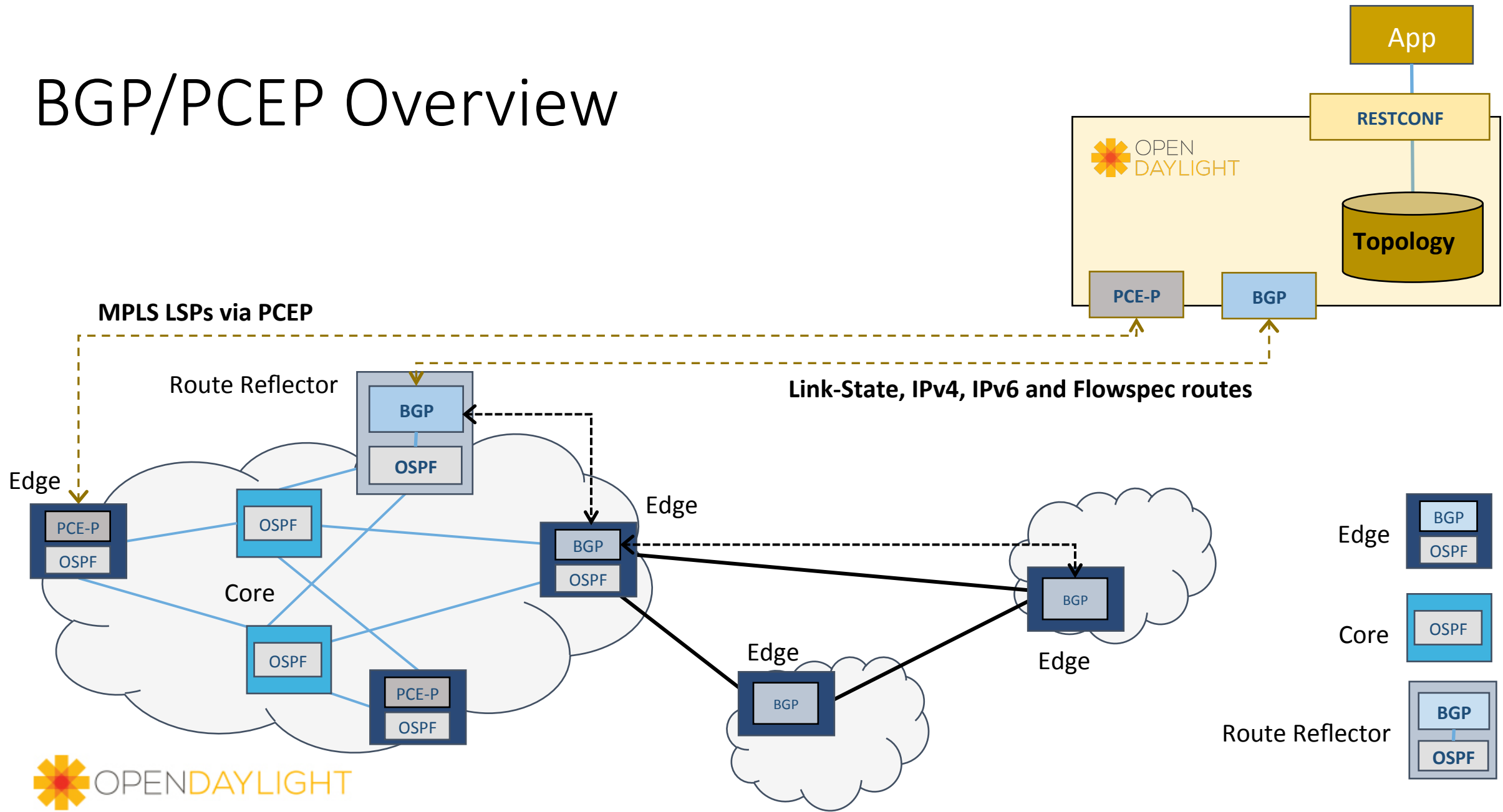
# Agenda

- Overview
- BGP-LS/PCE-P
- IPv4 and IPv6
- Advertising BGP routes
- Flowspec
- BMP



# Overview

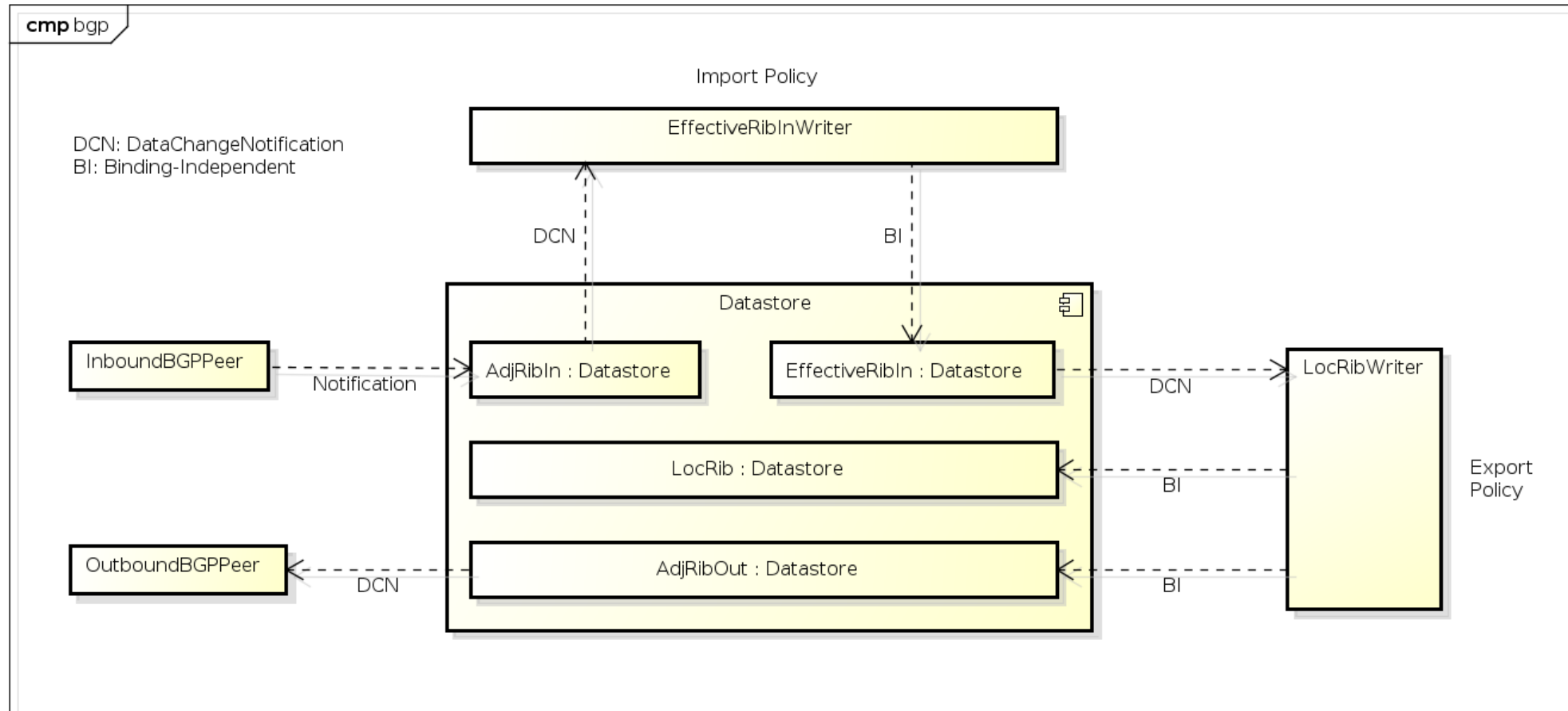
# BGP/PCEP Overview



# Routes

- **LinkState Routes:** intra-domain routes
  - From ISIS or OSPF and advertised via BGP-LS
  - Used to create linkstate topology
- **IPv4/IPv6 Routes:** routes across domains
  - “Internet routes”
  - Can both learn routes and advertise them
- **FlowSpec Routes:** packet filters
  - Like OpenFlow rules but can leverage BGP RR infrastructure
  - Actions encoded as BGP communities

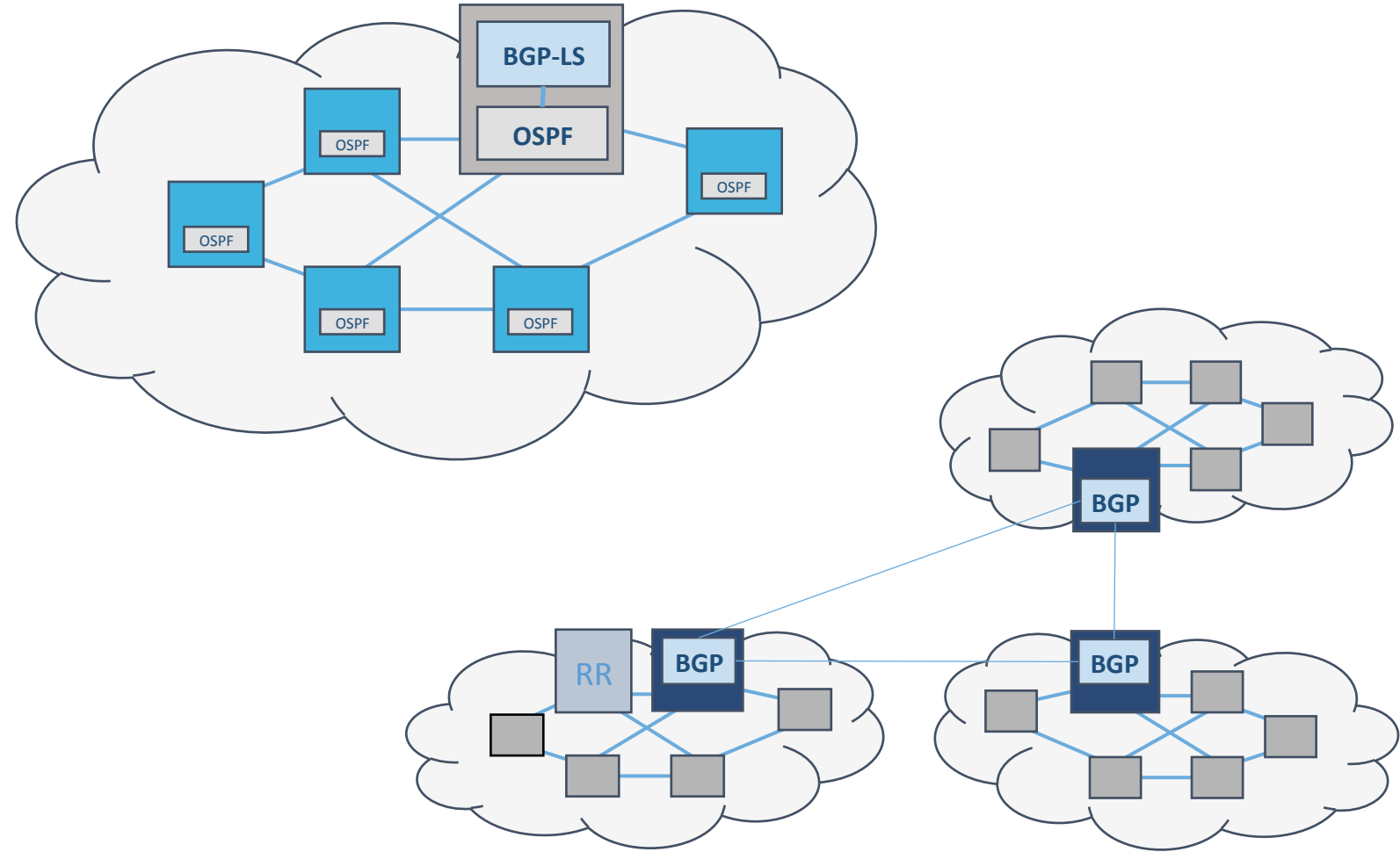
# Routes – the BGP RIB (or RIBs!)



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# Topologies

- LinkState
- IPv4
- IPv6
- PCE-P



# Configuring BGP

1. Modify 41-bgp-example.xml
2. Use RESTCONF
  - <http://localhost:8181/restconf/config/network-topology:network-topology/topology/topology-netconf/node/controller-config/yang-ext:mount/config:modules>

## Steps:

1. (optionally) modify port to listen on (if 179 then need to run as root!)
2. Configure RIB
3. Configure Peers



# BGP-LS Topology

**Network:** OSPF or IS-IS (IGP)

**Routes:** distributed from IGP into BGP-LS

**RIB:** Learned from BGP-LS speaker

**Topology:** Lists of nodes (routers) and links

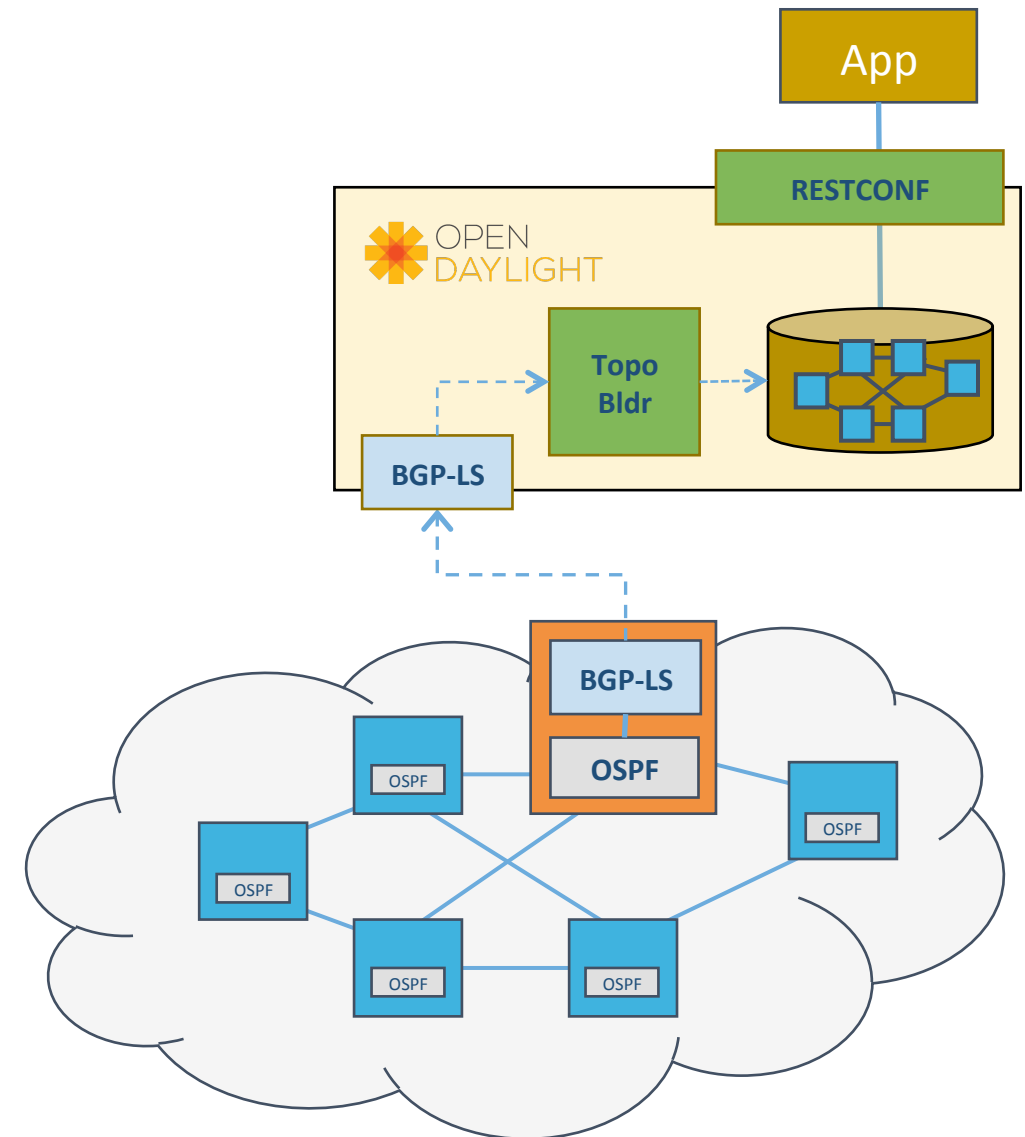
RESTCONF URL:

`http://localhost:8181/`

`restconf/operational/`

`network-topology:network-topology/topology/`

`example-linkstate-topology`

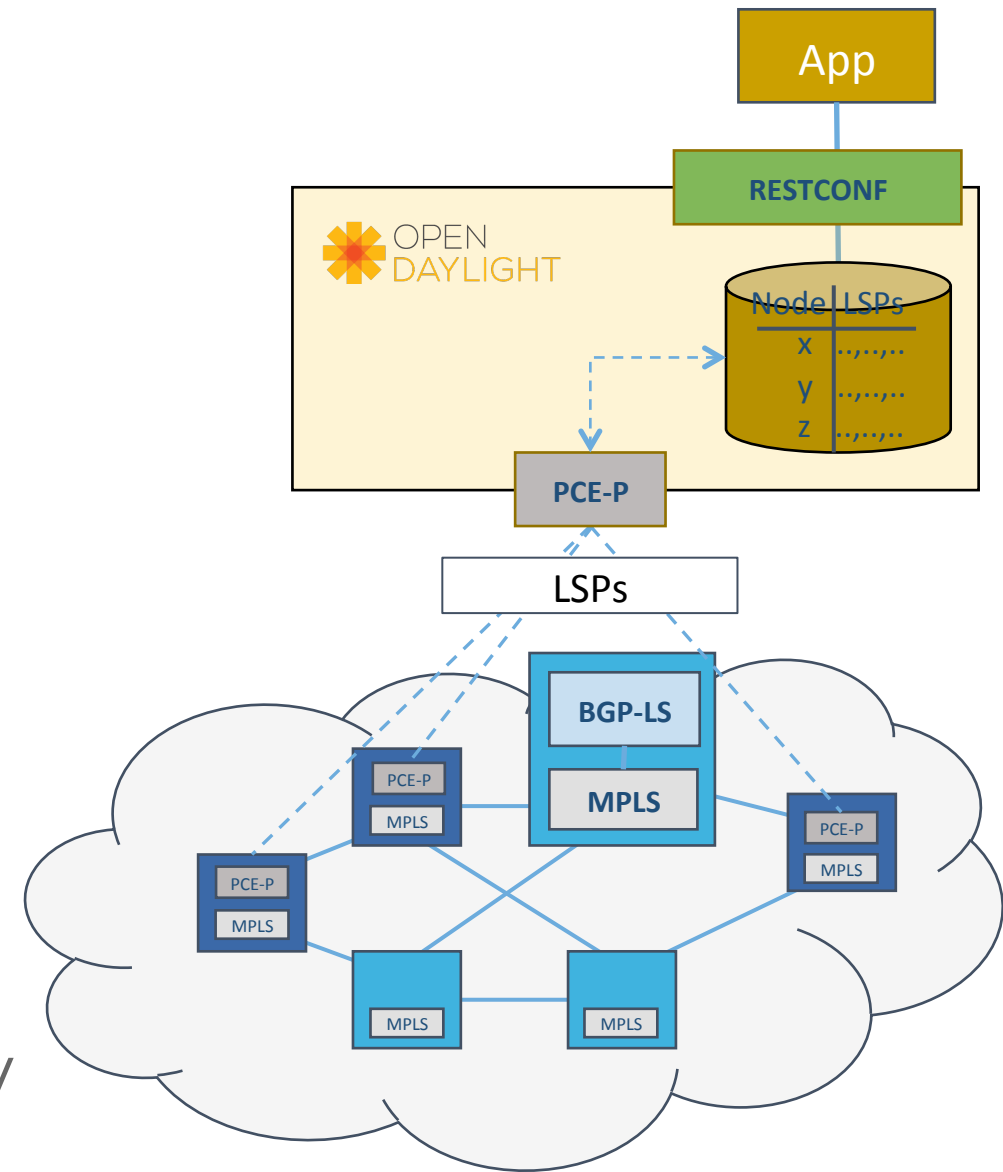


# PCE-P Topology

- List of all PCCs (Path Computation Clients)
- For each PCC, list of LSPs for which it is the head-end device.
- **Topology:** Created by PCE-P plugin

RESTCONF URL:

```
http://localhost:8181/  
restconf/operational/  
network-topology:network-topology/  
topology/pcep-topology
```

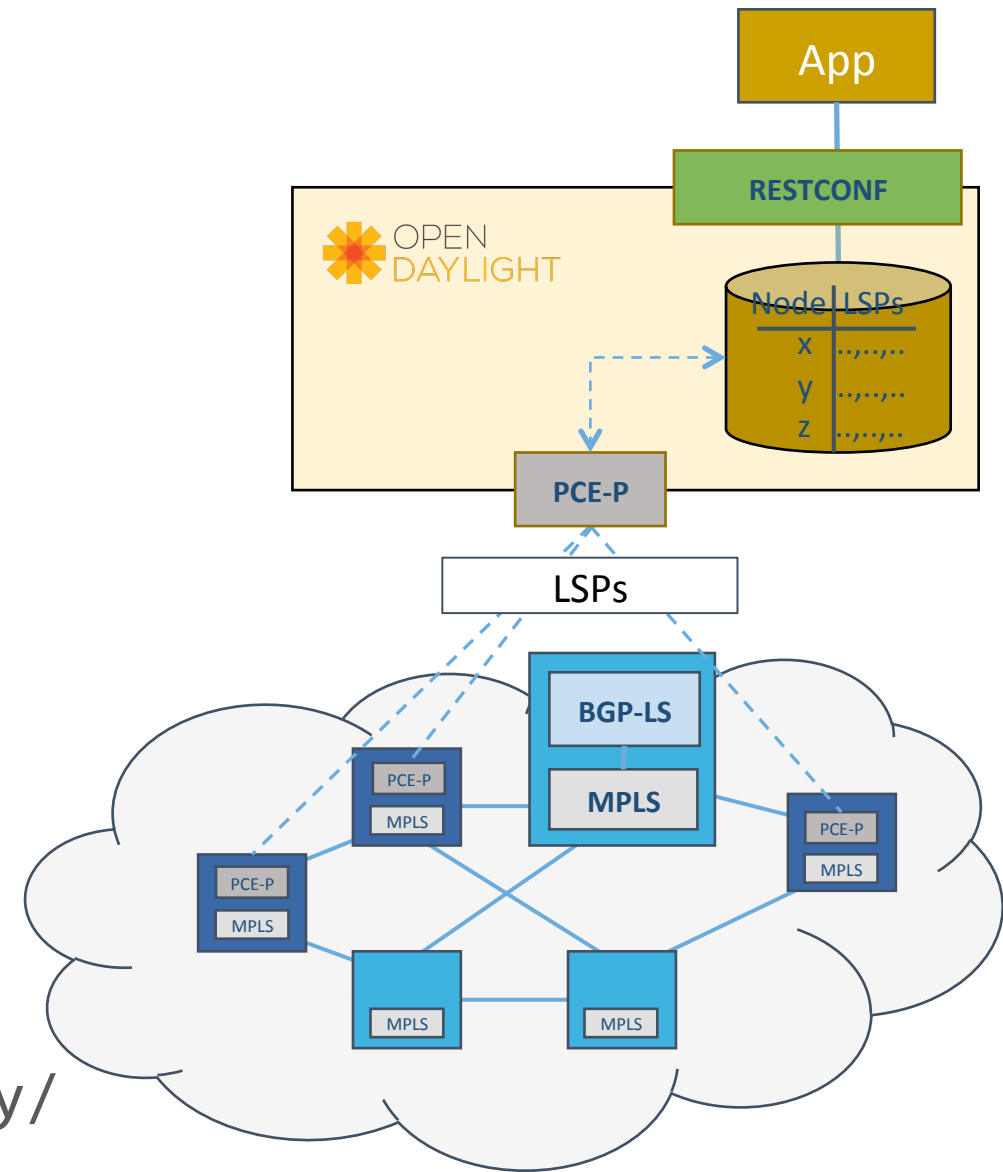


# PCE-P LSPs (dynamic)

- PCE creates MPLS-TE Label Switched Paths on PCC
- Can modify LSP after setup or delete LSP

RESTCONF URL:

```
http://localhost:8181/  
restconf/operations/  
network-topology:network-topology/  
topology/pcep-topology:add-lsp  
(update-lsp / remove-lsp)
```

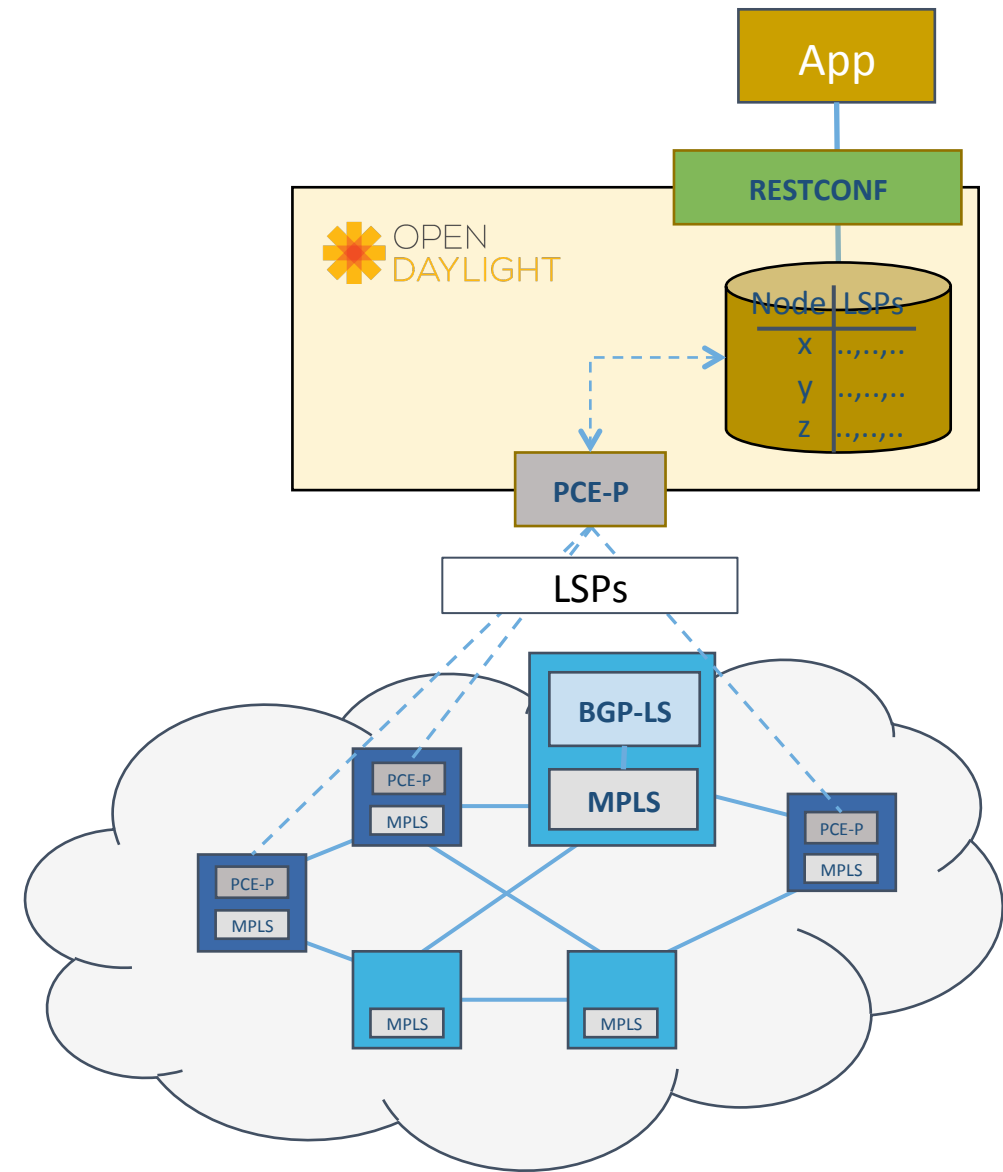


# PCE-P LSPs (delegated)

- PCC delegates locally configured MPLS-TE LSP to PCE for path selection:

```
interface tunnel-te1
  ipv4 unnumbered Loopback0
  signalled-name foo
  !
  destination 192.168.100.4
  path-option 1 dynamic pce
  pce
    delegation
```

- Use update-lsp RPC to set path





# Demo BGP-LS/PCE-P

# IPv4 (BGP) Topology

**Network:** BGP sessions between ASes

**Routes:** IPv4 unicast BGP routes

**RIB:** Learned from Route Reflector

**Topology:** List of BGP next-hops  
(and prefixes per next-hop)

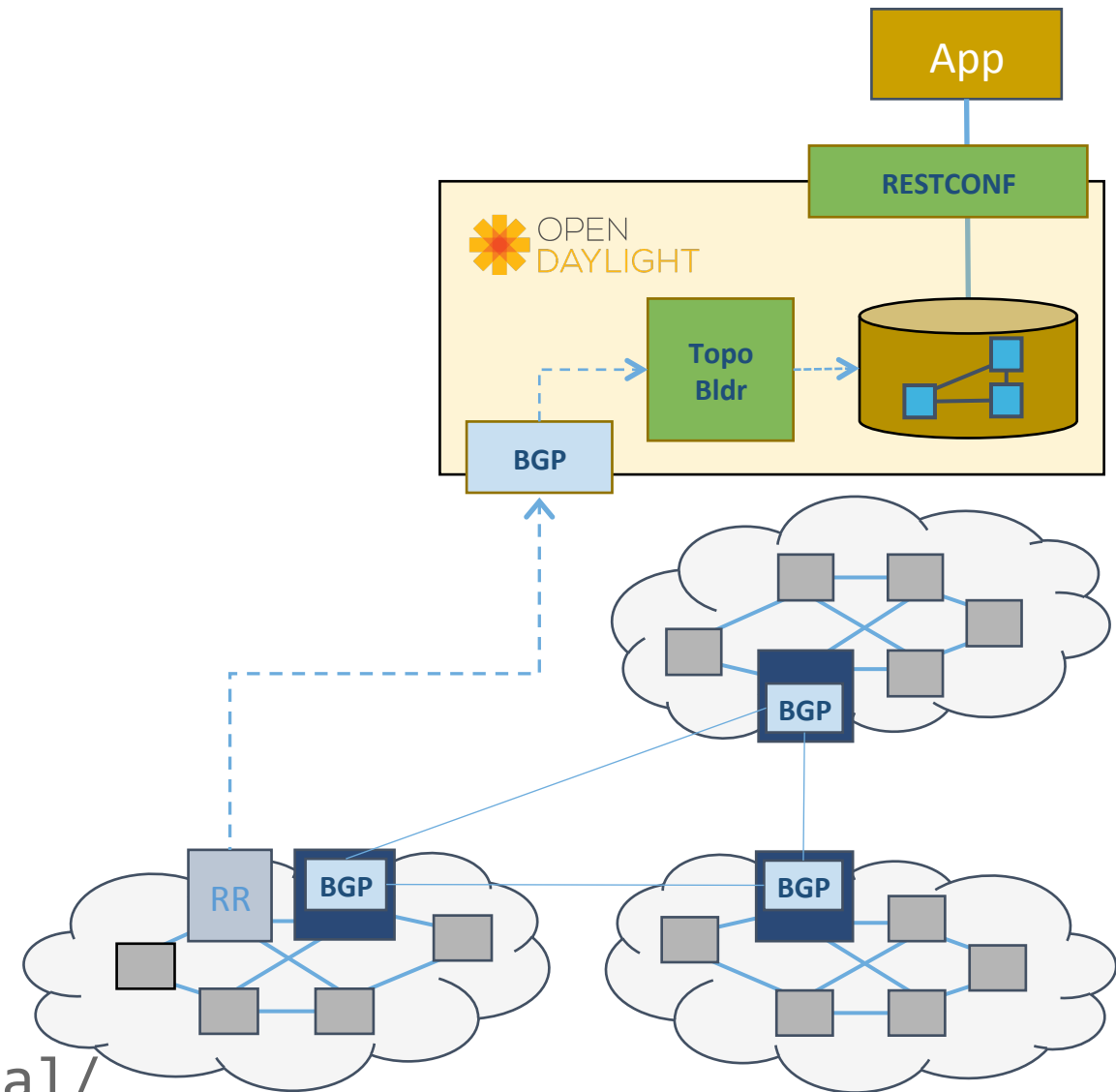
RESTCONF URL:

`http://localhost:8181/`

`restconf/operational/`

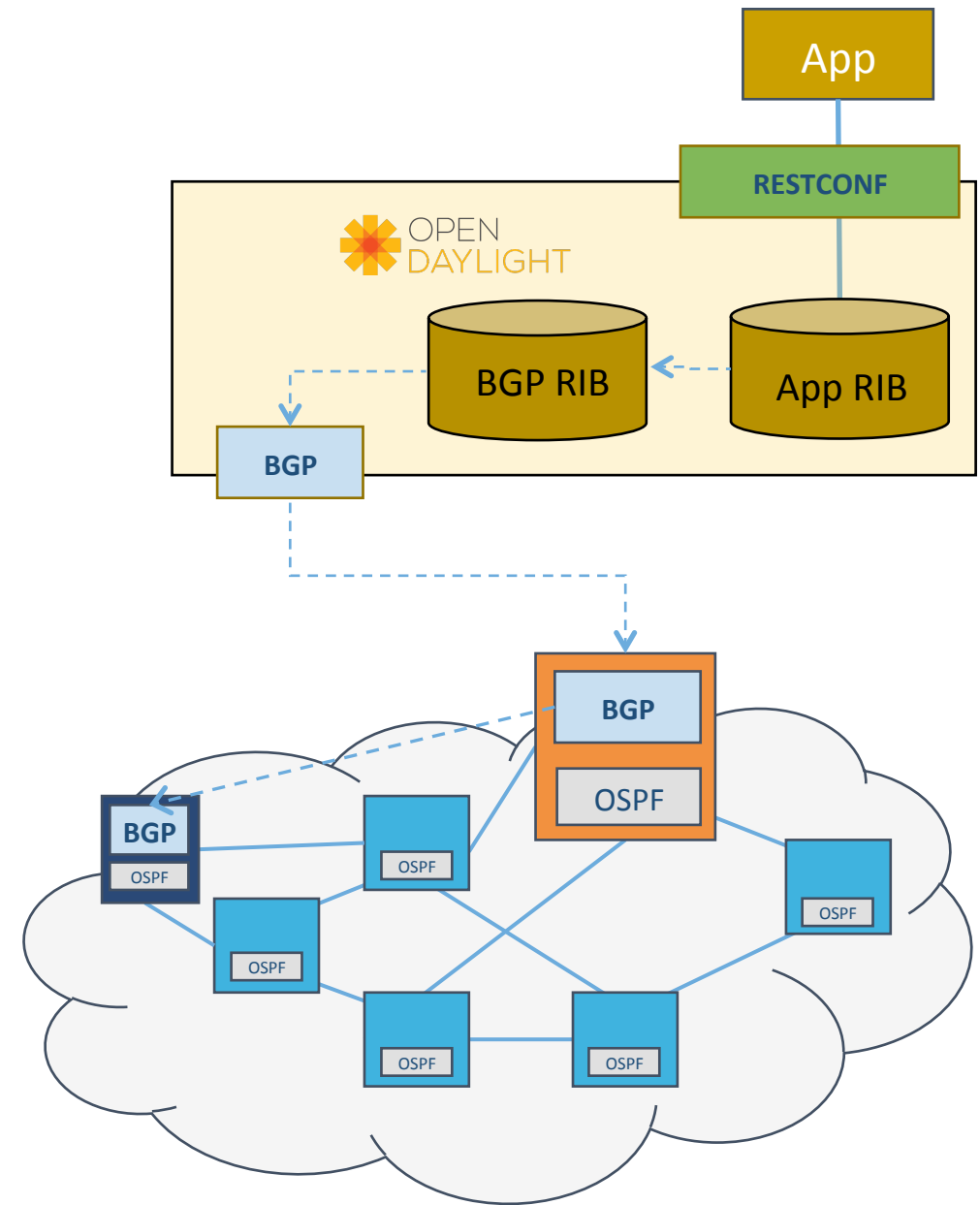
`network-topology:network-topology/topology/`

`example-ipv4-topology`



# Advertising BGP Routes (Application RIB)

- **IPv4/IPv6 Routes:** inter-domain routes
- **FlowSpec Routes:** packet filters
- APP RIB is config (main RIB is operational)
  - APP RIB is an iBGP peer of the main RIB
  - So need eBGP to real peers (for now!)





# Demo

# Advertising IPv4 Routes



# Setting “Flows” (FlowSpec)

RFC5575 - Similar to OpenFlow but uses BGP to distribute match/action rules

## Matches:

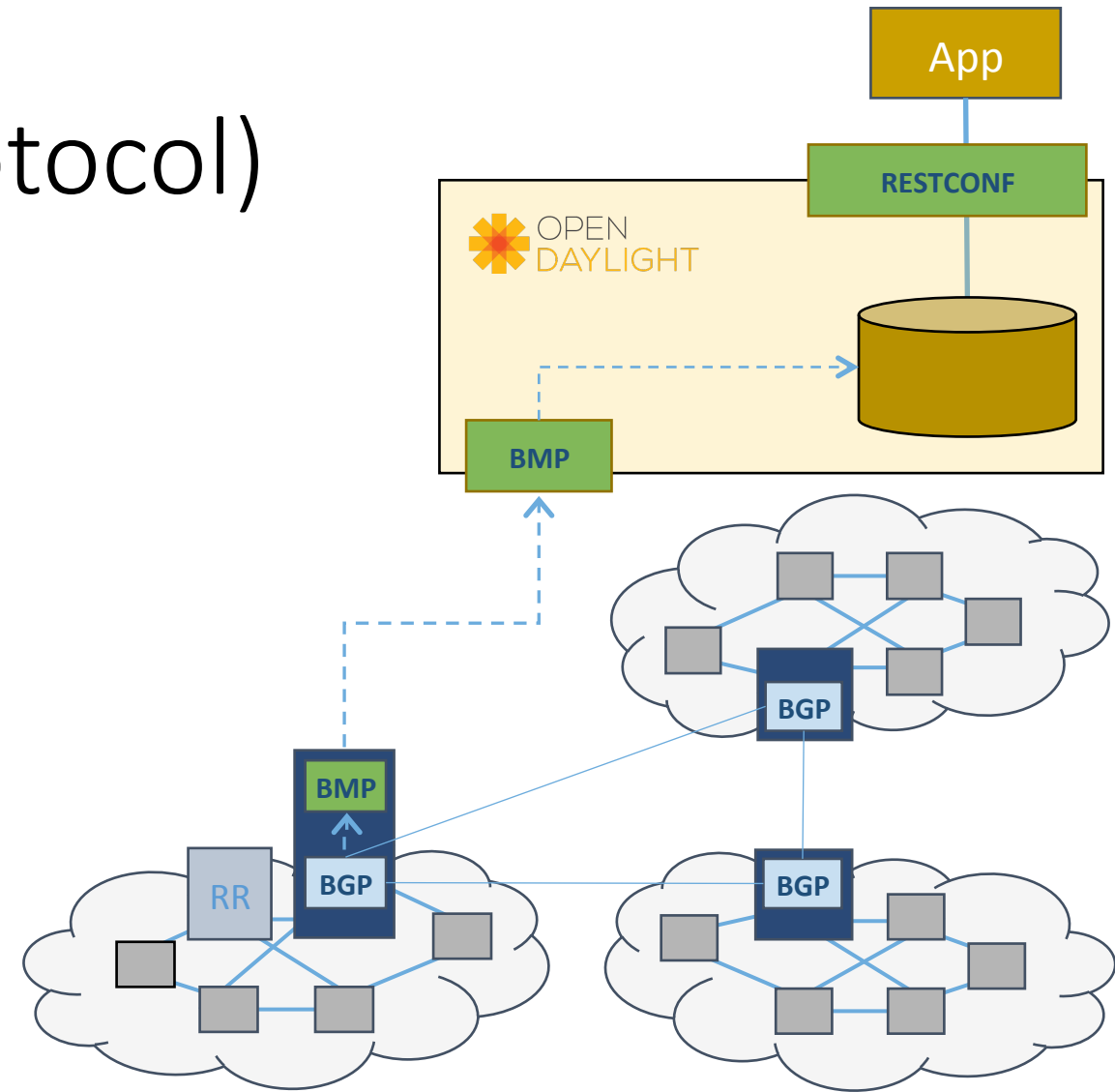
- Source / Destination IP prefix
- IP Protocol
- Source / Destination TCP/UDP port
- ICMP Type / Code
- TCP Flags
- Packet Length
- DSCP Field
- Fragment (DF, IsF, FF, LF)

## Actions:

- Rate limit
- Traffic sampling
- Redirection
- Traffic marking (DSCP)
- And more... (optional)

# BMP (BGP Monitoring Protocol)

- draft-ietf-grow-bmp-11
- Enables access to peer's adj-rib-in and effective-rib-in
  - Means you get a shedload of prefixes!





# Demo BMP



Thank you