

BGP TRAFFIC ENGINEER WITH SDN CONTROLLER BGP-LU EPE AND SEGMENT ROUTING

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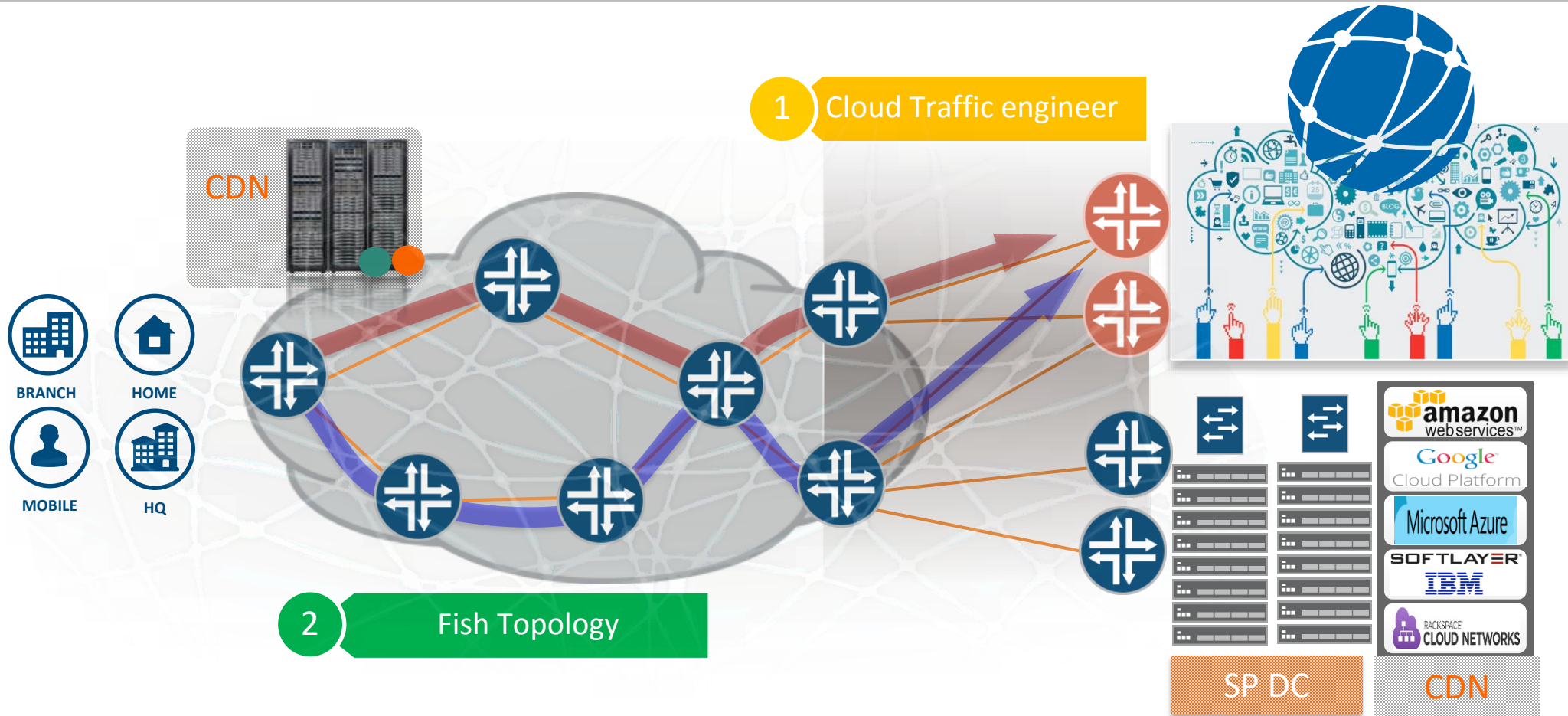
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AGENDA

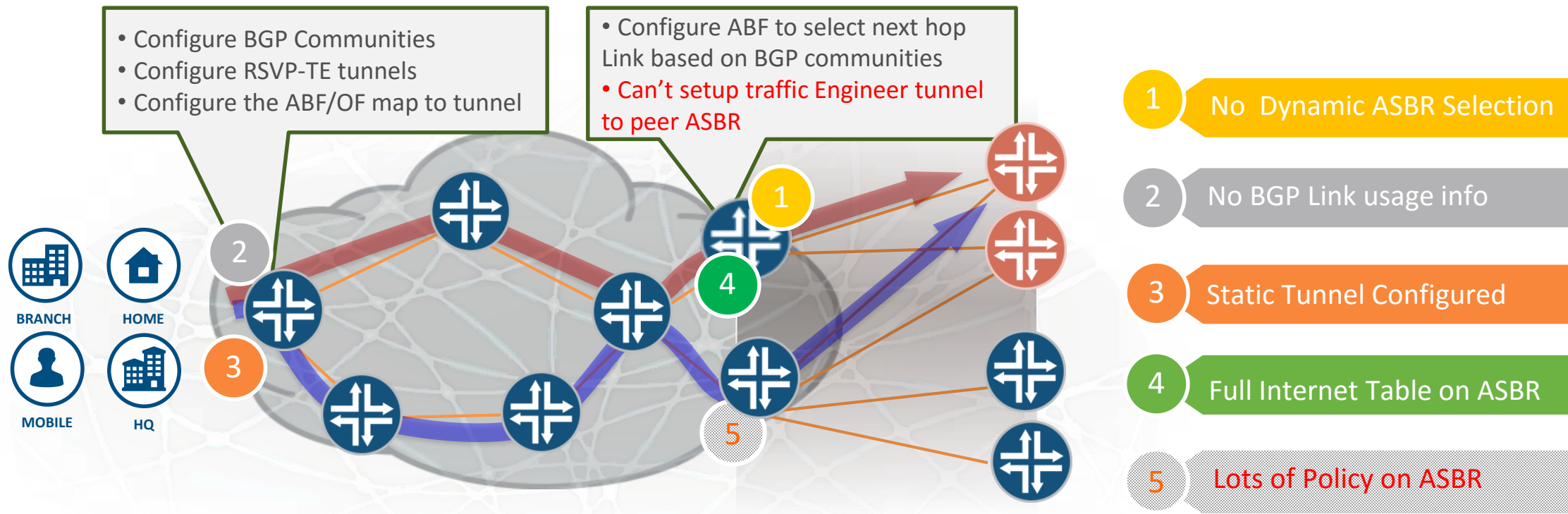
- 1 Inter-Domain Traffic Engineer
- 2 EPE and SPRING End-to-End solution
- 3 Use Case and Benefits
- 4 Summary

INTER-DOMAIN CLOUD TRAFFIC ENGINEER



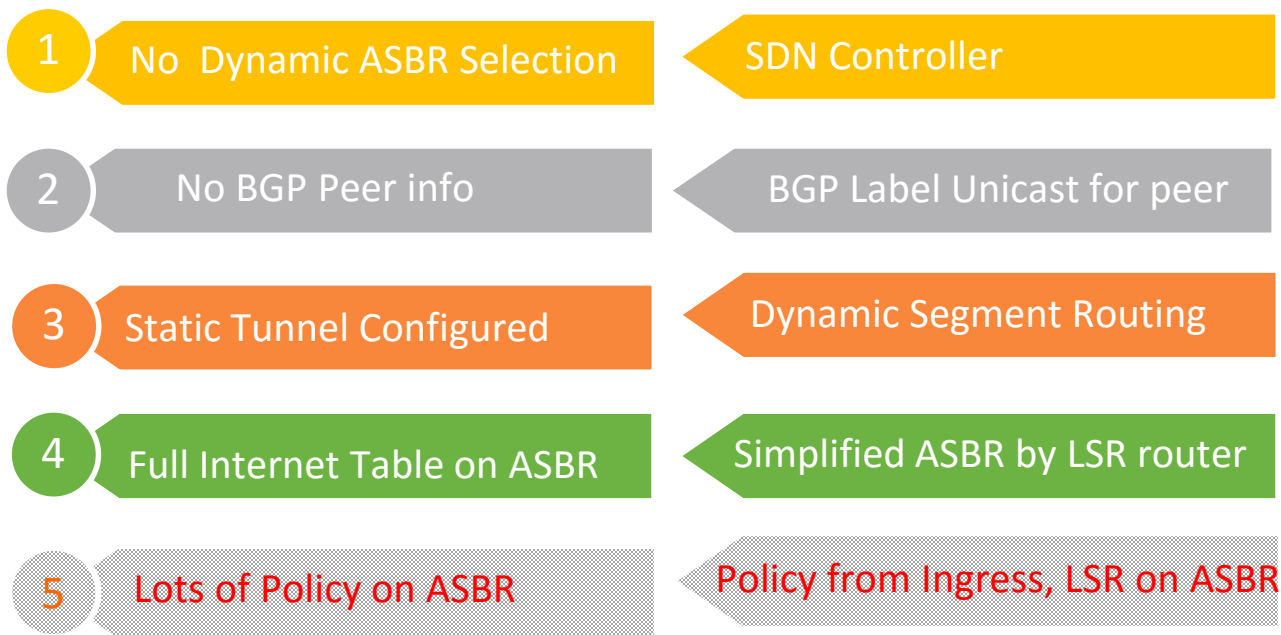
Easy to optimize End-To-End Traffic for SP Owned Network.
How to optimize VIP Customer for Internet/Cloud connection?

CURRENTLY SOLUTION AND LIMITATIONS



Current Solution can't meet Cloud Traffic Engineer Requirement

CLOUD TRAFFIC ENGINEER SOLUTION COMPONENTS



Egress Peering Engineer

- draft-gredler-idr-bgplu-epe-04
- draft-ietf-idr-bgpls-segment-routing-epe-02
- draft-ietf-spring-segment-routing-central-epe-00

Segment Routing

- draft-ietf-spring-segment-routing-0x

With Controller, Segment Routing and LSR Switch can build Cheaper and Optimized Cloud traffic Engineer

BGP EPE DESIGN PHILOSOPHY

How to Select Which Peer to send

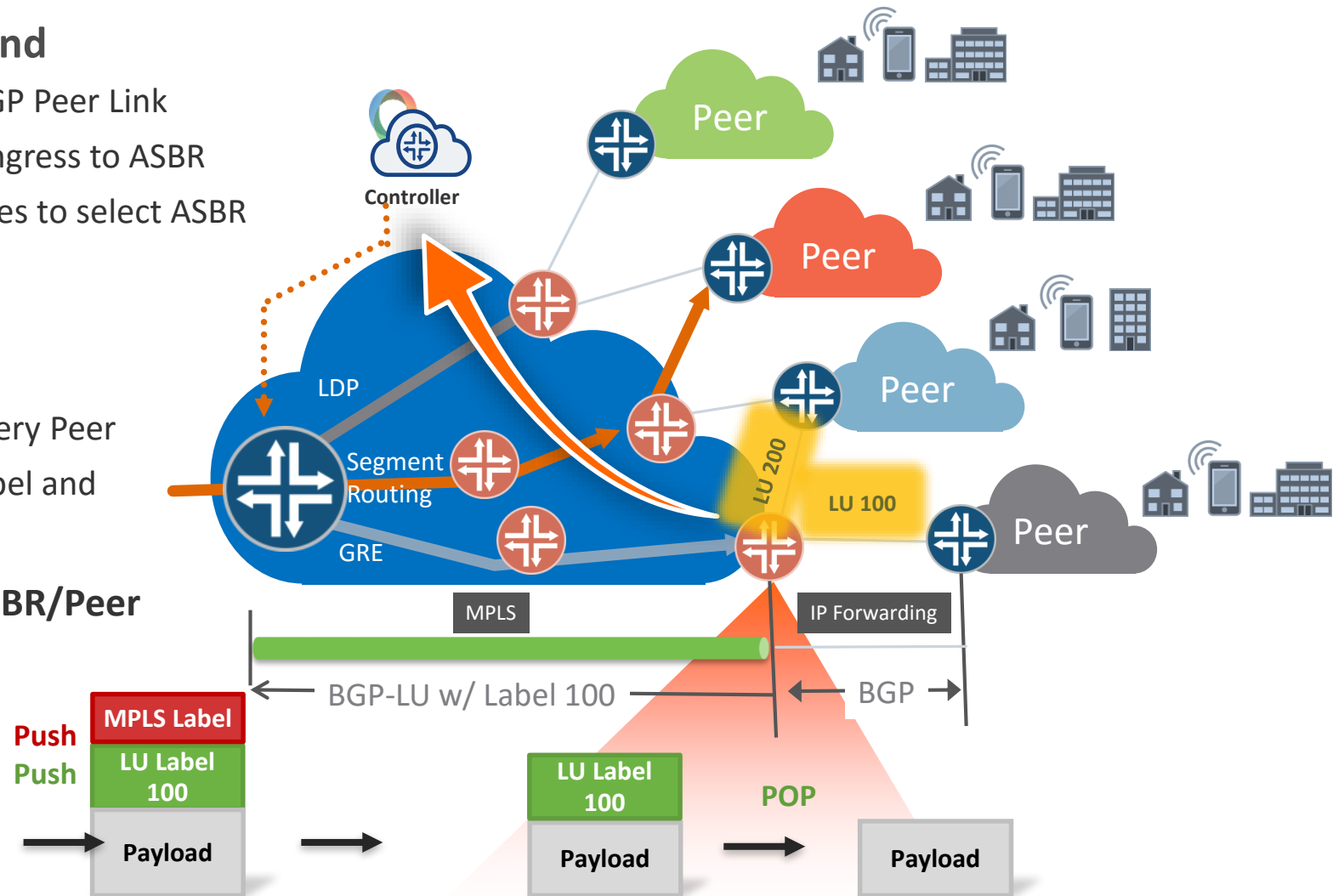
- Controller/RR may monitoring the BGP Peer Link
- Controller/RR find a tunnel from Ingress to ASBR
- Controller/RR based on certain rules to select ASBR

How ASBR identify a Peer

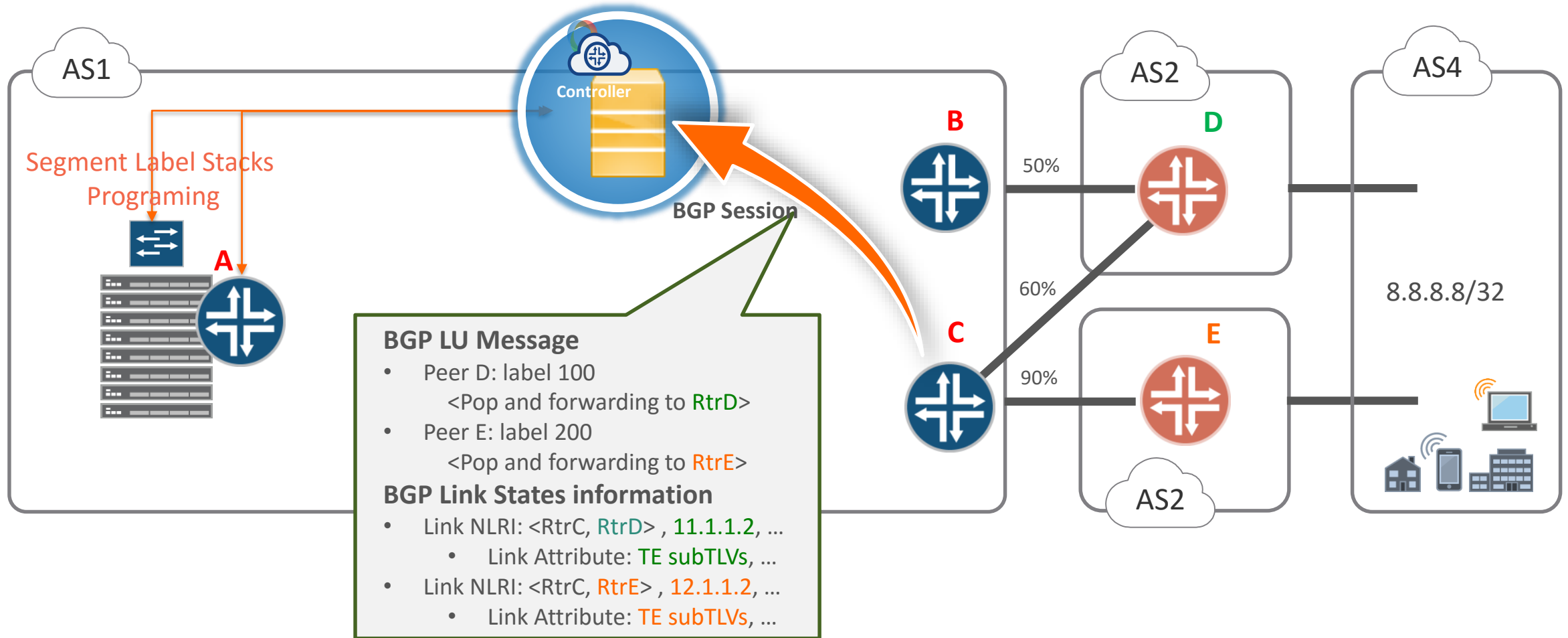
- Per Peer /32 address per label
- Install the MPLS Label POP for every Peer
- When ASBR received different label and send traffic to specific Peer

How Ingress mapping traffic to ASBR/Peer

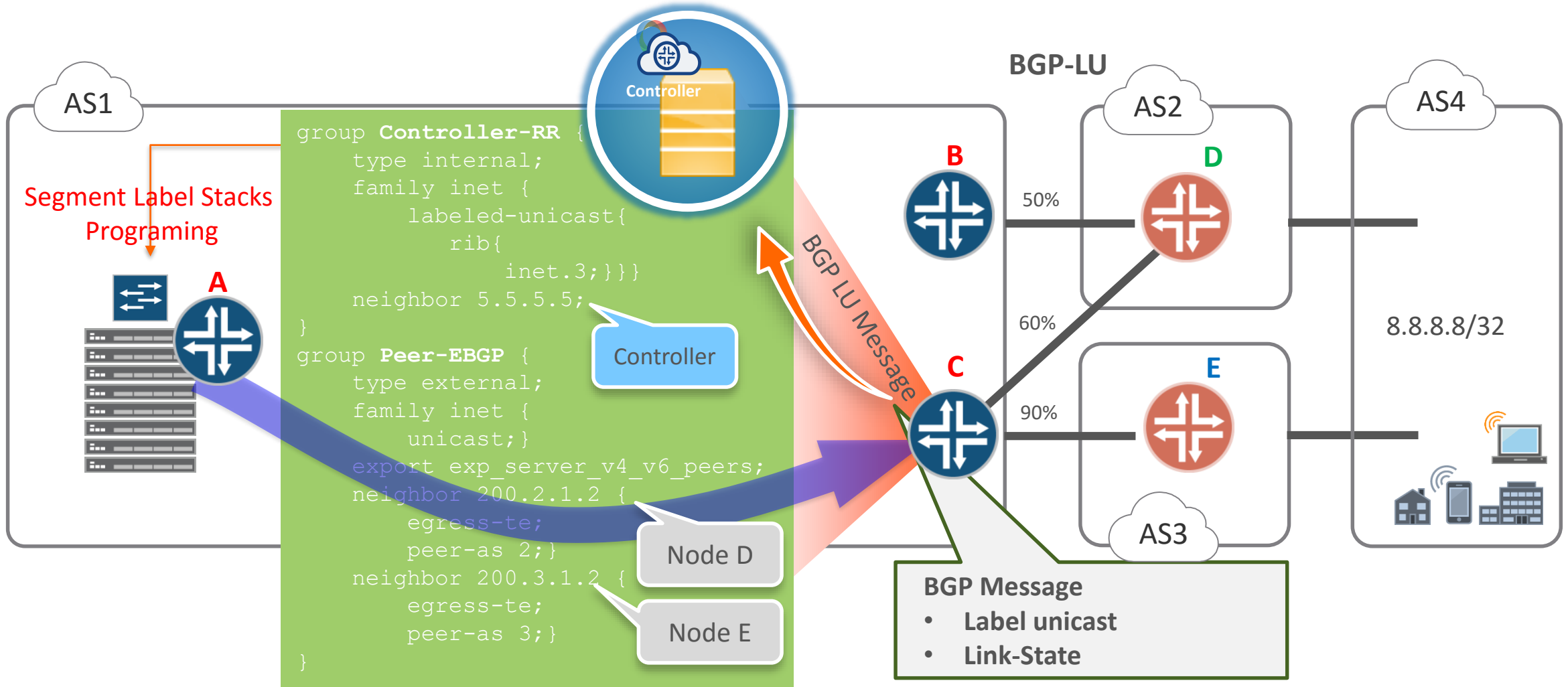
- Ingress push tunnel label to ASBR
- Ingress push BGP-LU label



BGP EGRESS PEER ENGINEERING/BGP-LU DETAIL



BGP EGRESS PEER ENGINEERING/BGP-LU DETAIL



BGP LU AND FRR BACKUP

BGP LU no IP lookup on ASBR

Normally MPLS label POP and forwarding

- Per Peer /32 address per label

Use FRR in same ASBR

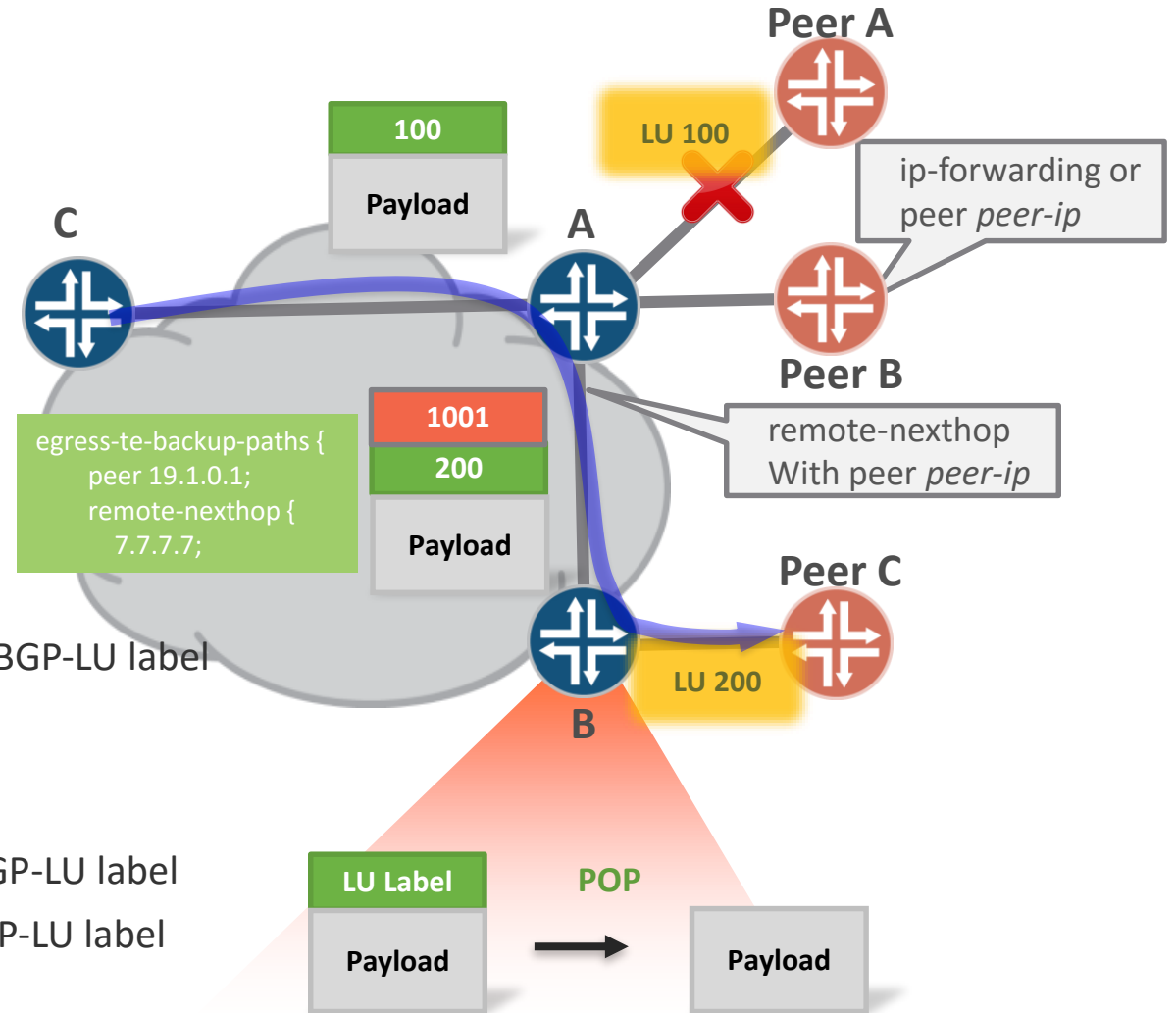
- IP-forwarding option, remove the LU label and then IP lookup
- Peer *peer-ip*, send to backup peer directly

For remote ASBR, leverage remote-nextthop for FRR

- Setup tunnel to remote ASBR
- Get rid of BGP-LU label and replace by the remote neighbor's BGP-LU label

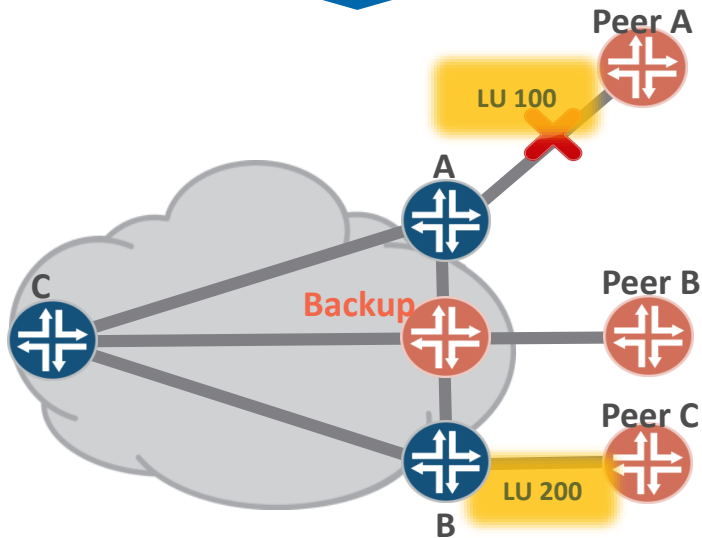
For ASBR failure, will need Egress Protection

- Remote Anycast ASBR need to understand the Failure ASBR BGP-LU label
- Or Remote Anycast ASBR will just do IP-lookup, ignore the BGP-LU label
- For future implementation



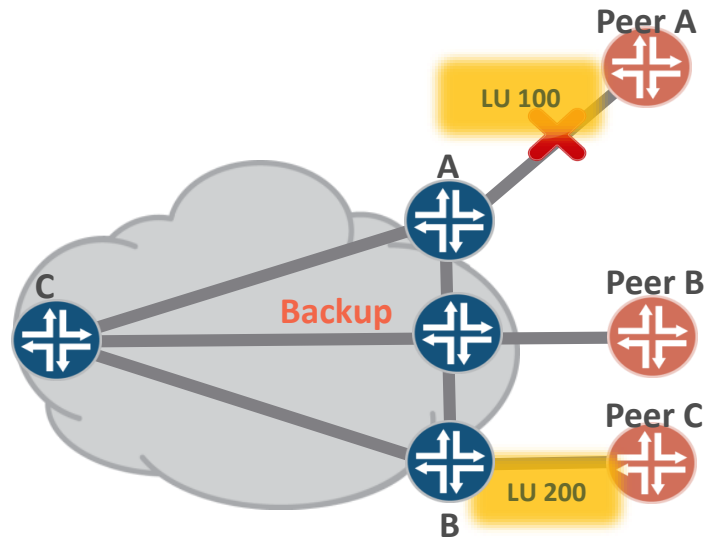
LSR BGP PEER DEPLOYMENT AND CONSIDERATION

One/Two LER



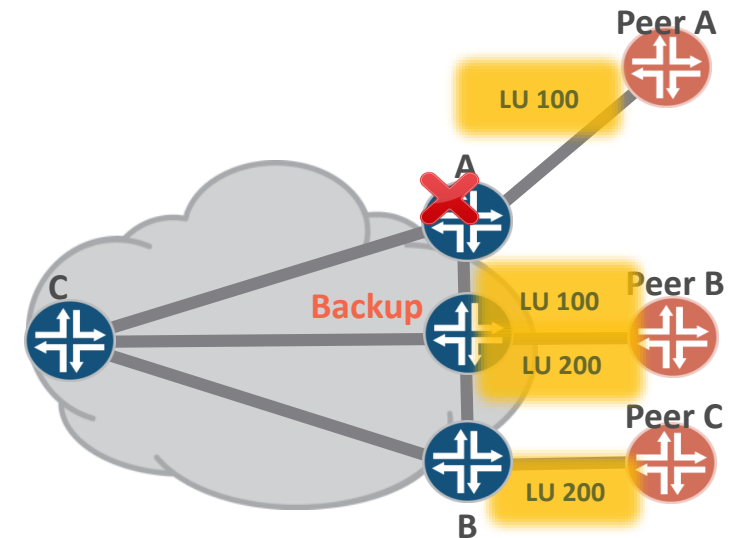
- Migrate most ASBR to LSR
- Keep 1 or 2 ASBR as legacy backup
- Redirect traffic to legacy and IP forwarding

All LSR



- Migrate All ASBR to LSR
- Redirect traffic to backup also follow BGP-LU label forwarding

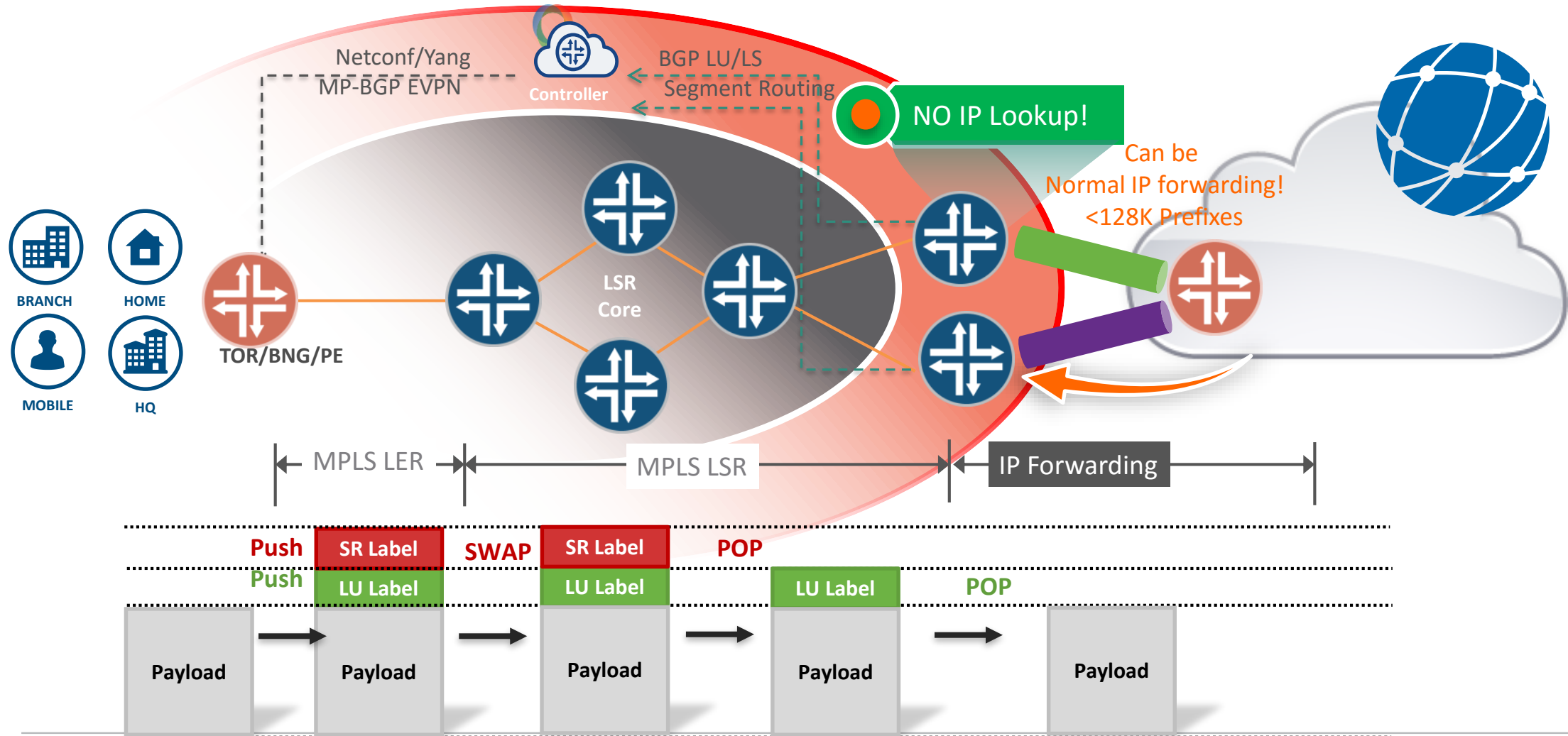
ASBR Failure



- Migrate All ASBR to LSR
- In case of ASBR failure
- Redirect traffic to backup which keep all other BGP-LU information follow BGP-LU label forwarding

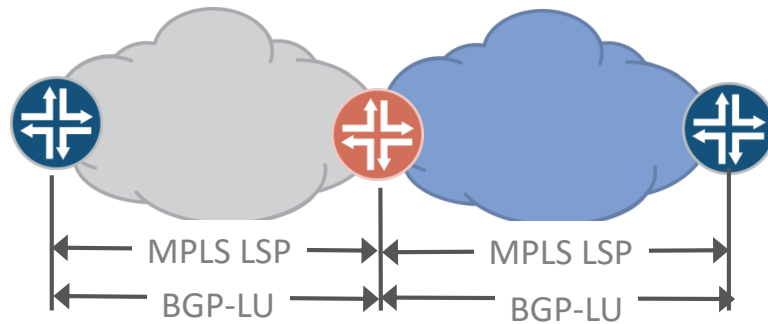
BGP-LU EPE & MPLS KEY BENEFITS

EXTEND HOLLOW CORE/LSR TO PEERING, CHEAPER PEERING SOLUTION



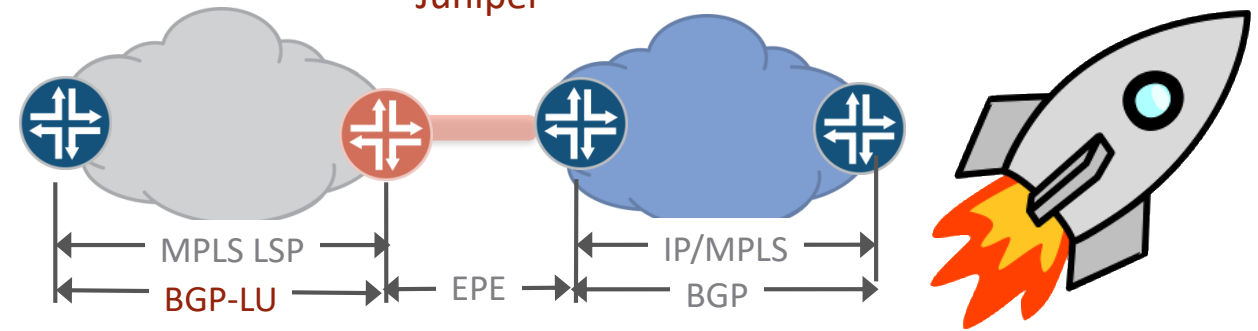
BGP-LU VS BGP-EPE FOR PEER TRAFFIC ENGINEER

BGP-LU for Seamless MPLS



BGP-LU for Peer Traffic Engineer

Juniper

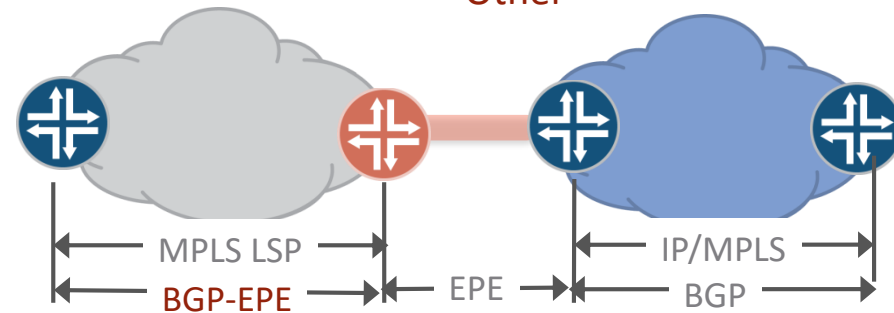


Egress Peering Engineer, 2 different Methods

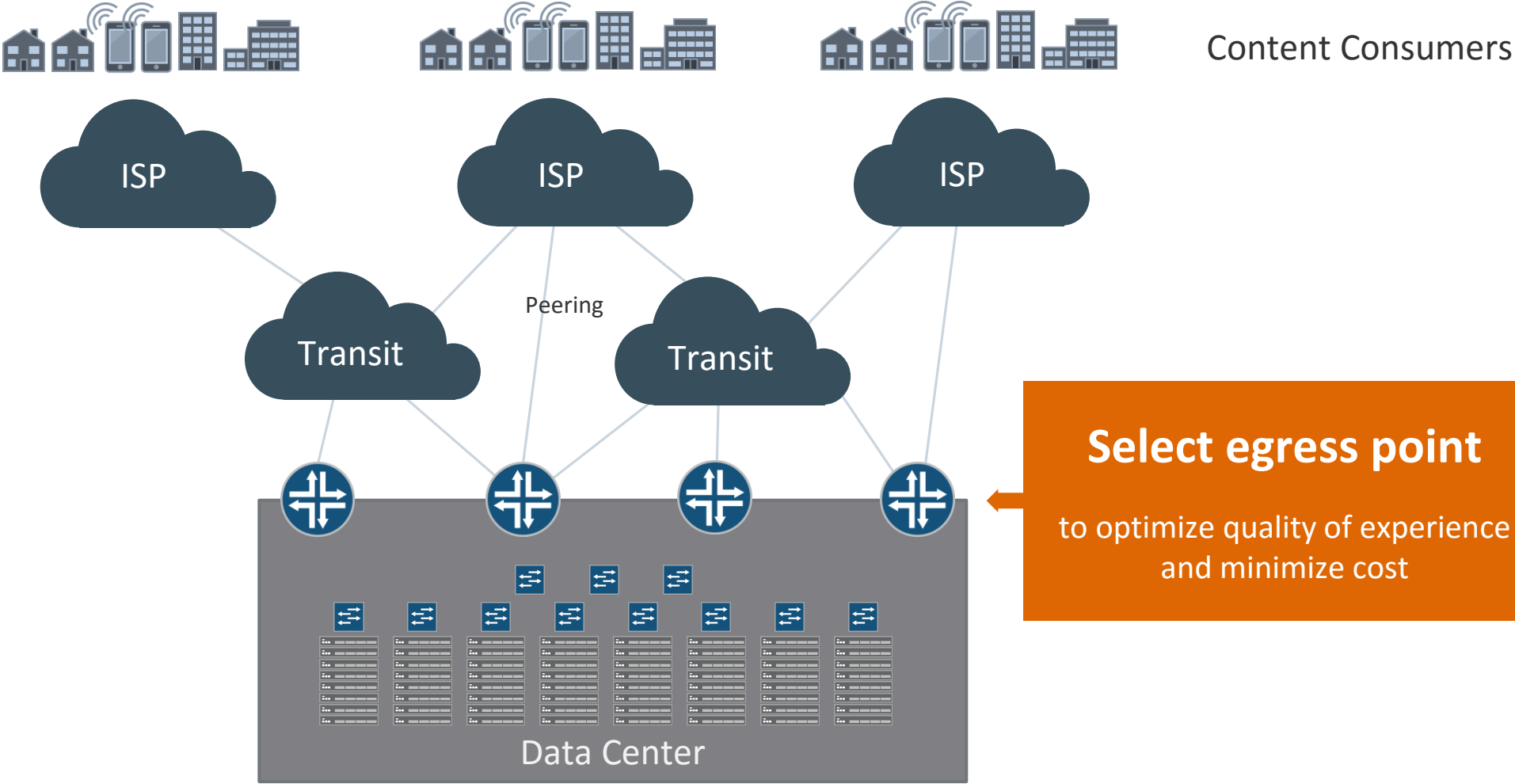
- **[Juniper]** draft-gredler-idr-bgplu-epe-04
 - No New Address Family, Any tunnel can apply
 - build in FRR method for Peer failure
 - Existing Solution with enhance, Fast Time to Market
- **[other]** draft-ietf-idr-bgpls-segment-routing-epe-02
 - New Address Family, request SR tunnels
- Both Assign a Label for Peer, no need upgrade Peer router, peer can be IP or MPLS forwarding

BGP-EPE for Peer Traffic Engineer

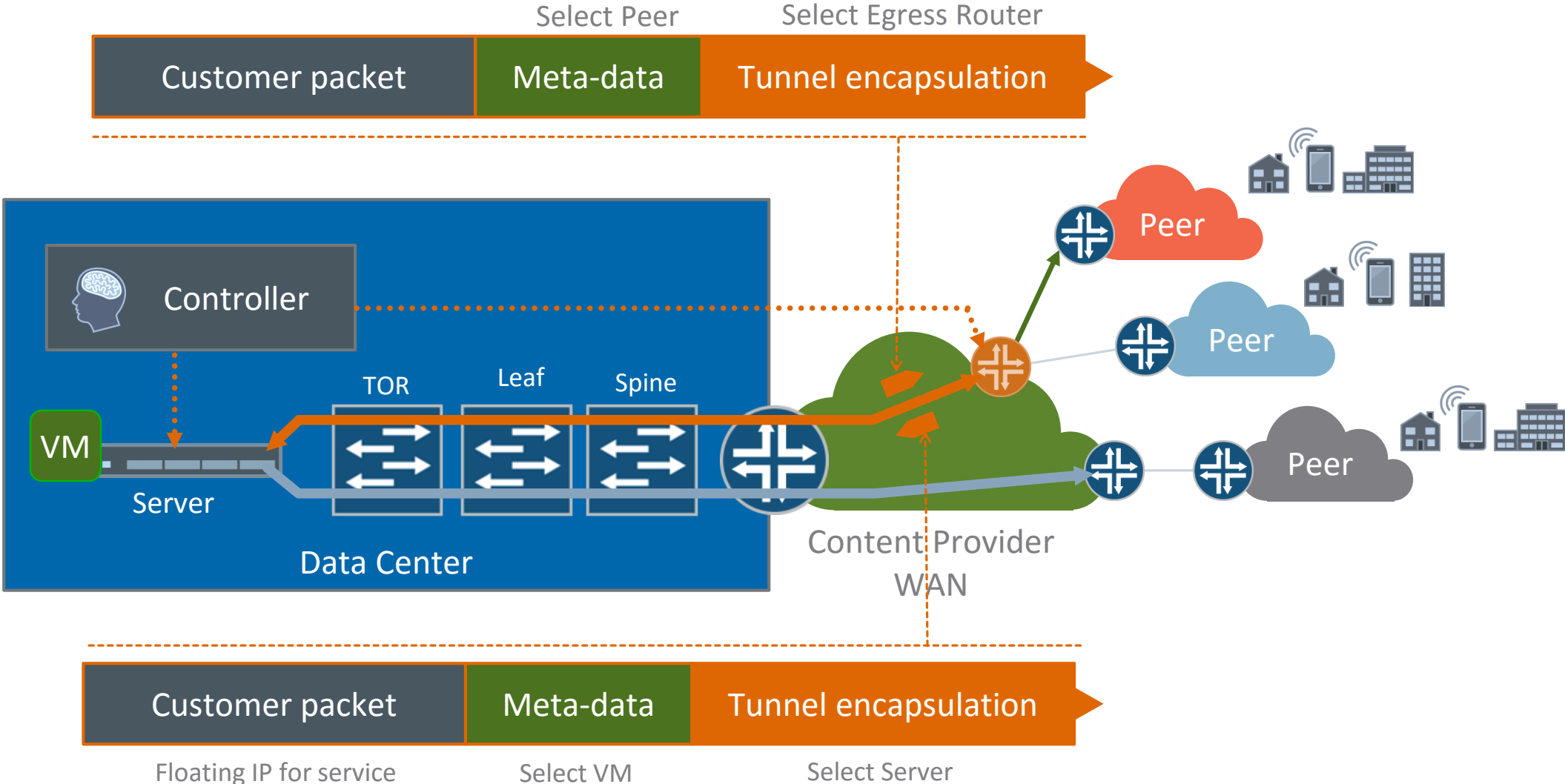
Other



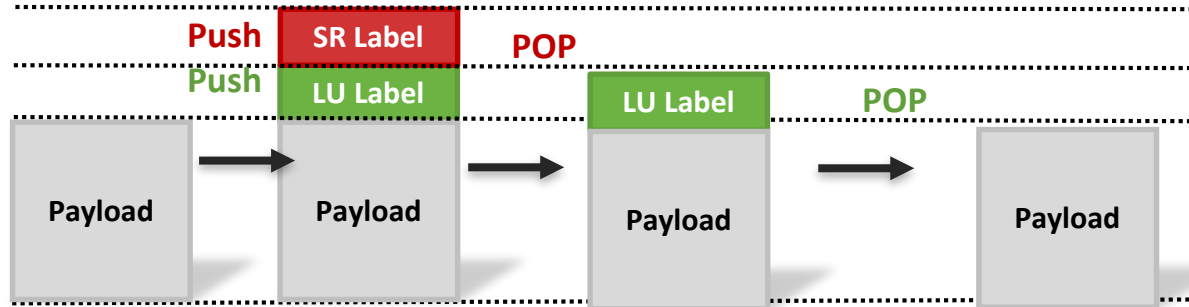
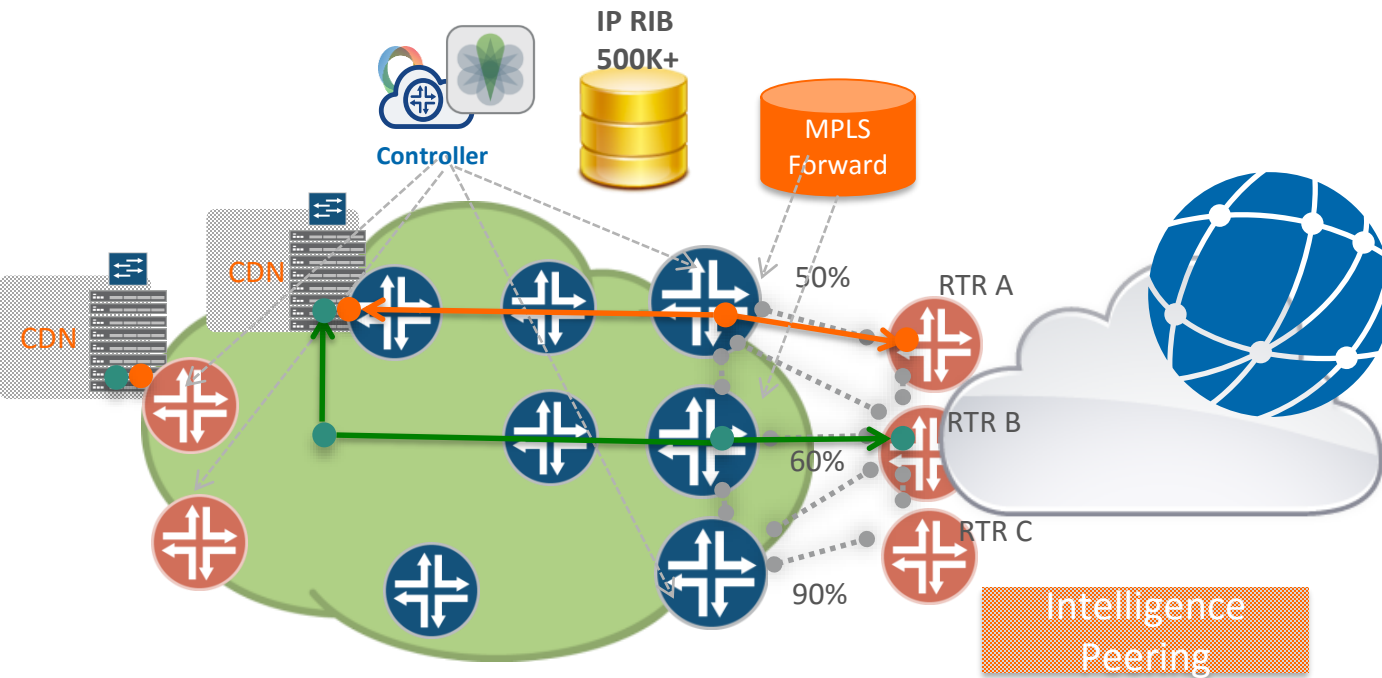
EGRESS PEER ENGINEERING (EPE) USE CASE IN DC



CONTROLLER AND EPE USE CASE



USE CASE, CDN PEERING



ASBR Setup BGP session and pass BGP-LU and BGP-LS information to Controller.

Controller Calculate the Path

- Controller select which Peer A/B/C send traffic to with LU label.
- Controller and ASBR take part in the Segment routing domain, and know to send traffic to ASBR adding a IGP/SR label or tunnels
- Controller will send MPLS label Stack to Ingress Router or Host

Controller keep monitor path and Egress link

- When Congestion happens, will automatically redirect traffic to another ASBR/Peer by changing the label stack

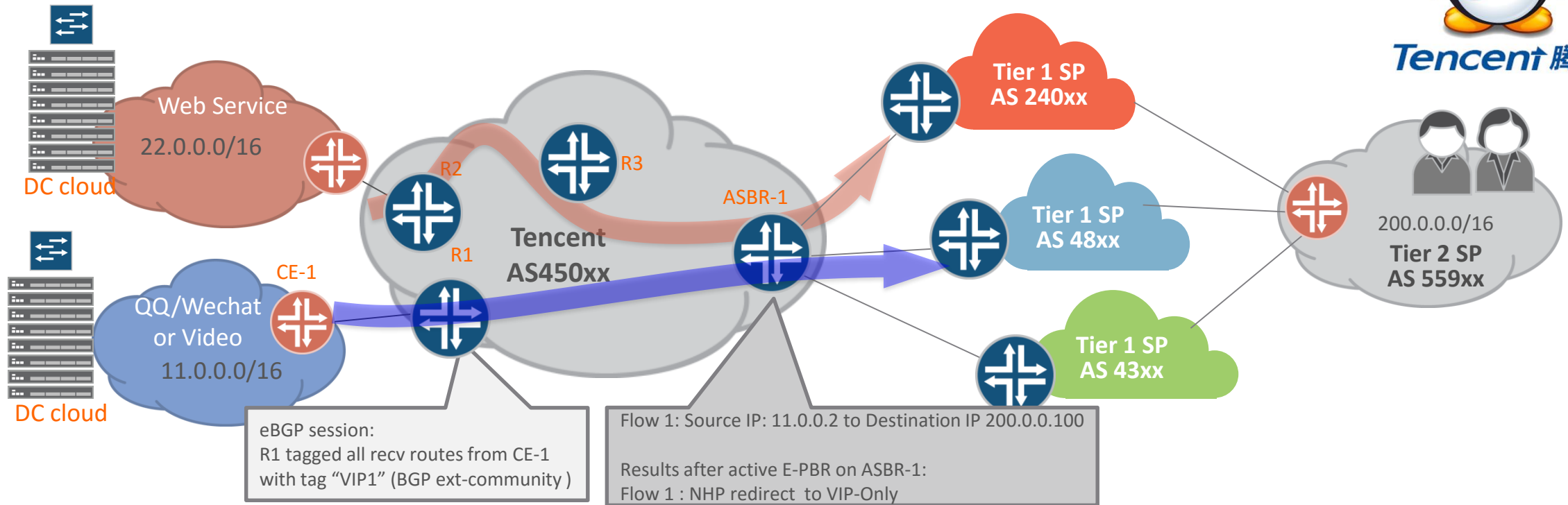
Separate Control/Forwarding

- Controller Full Internet Table, RIB, Control Plane only.
- ASBR only Keep LSR label switching, Forwarding Plane, No IP lookup

Policy start from Ingress

- Linux Host/Hypervisor/switch/router

WITHOUT EPE, CURRENT SOLUTION (TENCENT)



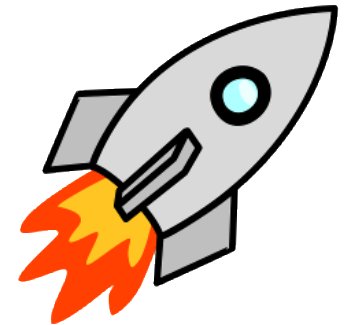
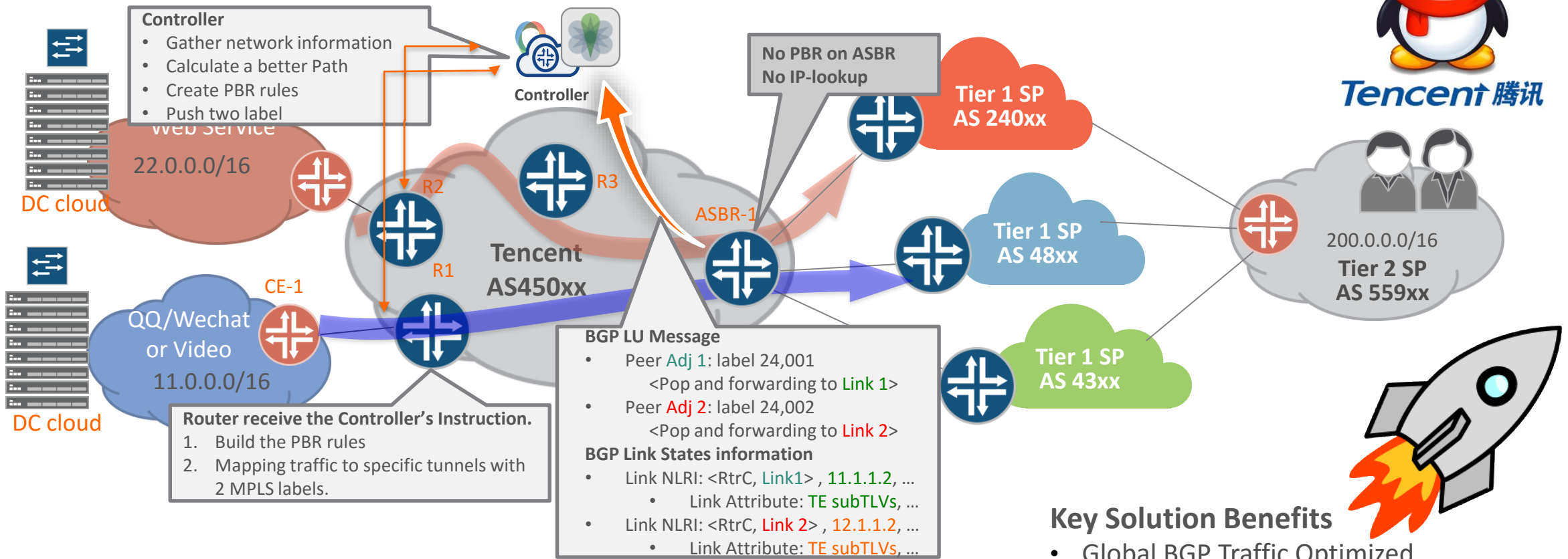
Tencent Peering Situation

- Peering with many Tier 1 and 2 SP, around 20+ peer AS.
- Peering from 4-5 cities across China, Beijing/Shanghai/Shenzhen/Guangzhou etc.
- Peering with Hongkong for international directly

Key Pain Points

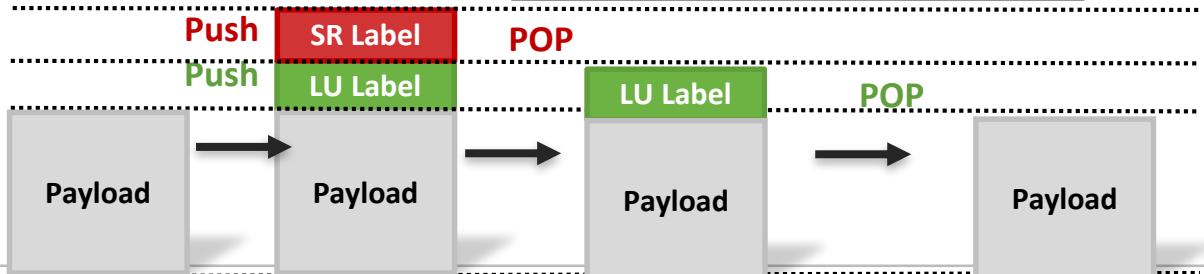
- No Global BGP traffic Engineering optimization
- Static RSVP tunnel, A lot of Policies on ASBR.
- Peering Traffic Grow so fast, how to save CAPEX on ASBR?

WITH EPE, PLANNING SOLUTION (TENCENT)



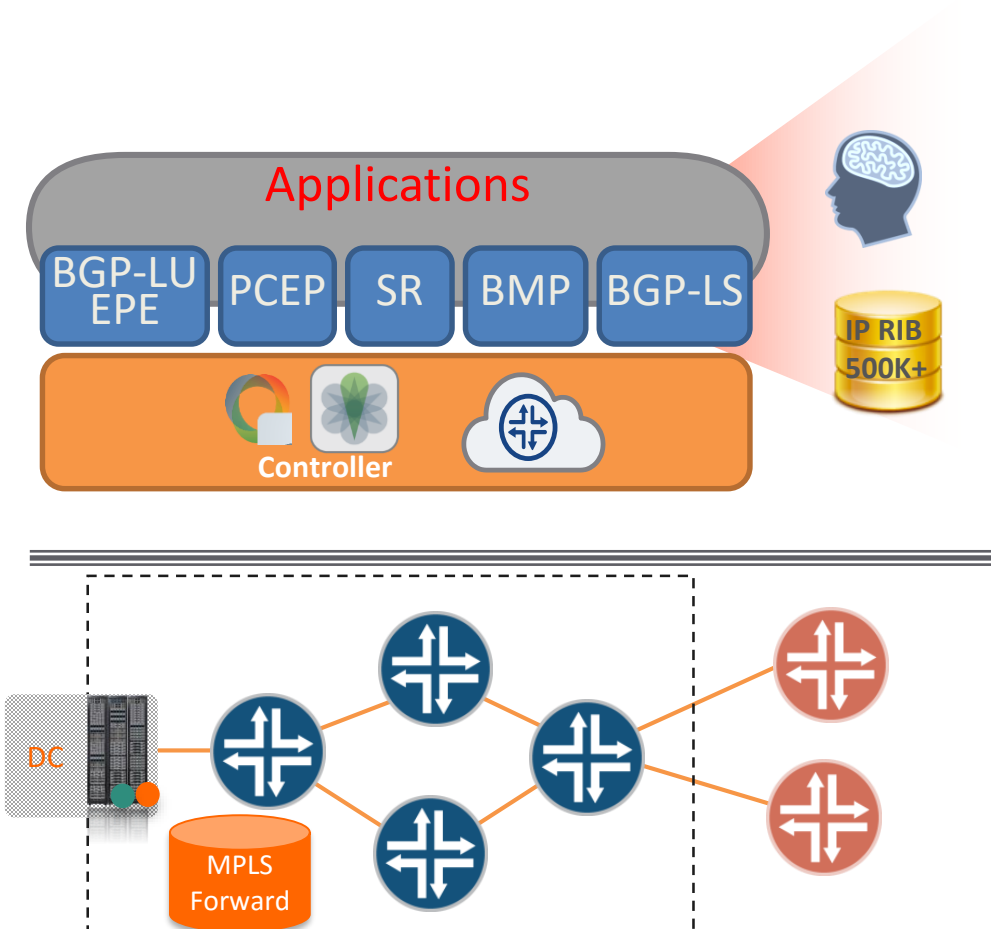
Key Solution Benefits

- Global BGP Traffic Optimized
- NO IP/PBR on ASBR
- Potential CAPEX saving on ASBR(LSR)
- Tencent All-IN Segment Routing
- Tencent All-IN Traffic Engineer WAN



APPLICATIONS DETAILS

SAME TECHNOLOGY FOR DC & WAN



Application is the Network Brian:

- BGP-LU EPE information from ASBR for peer label and internet prefix table.
- BGP-LS/Netflow information for all link TE TLV, and BMP for Prefix
- PCEP, Calculate Segment routing tunnel and apply 2+ labels in network
- Traffic Steering/mapping to tunnels, and monitor tunnels
- Easier to calculate Latency based routing for network wide optimized.

Controller for Segment routing Traffic Tunnel setup/monitor

Separate Control/Forwarding

- Controller Full Internet Table, RIB, Control Plane only.
- ASBR only Keep LSR label switching, Forwarding Plane, No IP lookup

SUMMARY

1

Extend Traffic Engineer to Cloud, Global Network Optimized

2

SDN Controller Solution, Automatic Congestion/Latency Optimized

3

Simplified ASBR Design, no IP, no Policy, LSR only

4

Controller/Application support full intelligence RIB/Traffic Telemetry

5

Standard Based solution, work with existing peer ASBR

THANK YOU