

EQUINIX

**Internet Exchange Fabrics:
VLAN to VXLAN Conversions**

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Internet Exchange (IX)

Usage & Benefits

- **Internet Exchange Point***

- IX or IXP is a physical infrastructure through which ISPs and CDNs exchange internet traffic between their networks
- IXPs allow networks to interconnect directly via the exchange rather than through third party networks or upstream providers
- Traffic exchange between participants of IX is facilitated via BGP
- Public VLAN & Private VLAN capabilities to peering participants

- **Benefits of IX**

- Reduced Cost
- Better Latency
- Increased Bandwidth

* Wikipedia

Internet Exchange (IX)

Typical Deployments

- **Current Technologies deployed in IX:**

- VLAN w/ STP, MSTP
- VPLS
- VXLAN

- **Equinix IX Evolution**

- Existing: VLAN w/ STP, MSTP
- Future: VXLAN

Internet Exchange (IX)

VXLAN & its benefits for an IX deployment

- **VXLAN**

- Tunneling mechanism to overlay Layer 2 networks on top of Layer 3 networks
- “MAC in IP” encapsulation
- Layer 2 multi-point tunneling over IP UDP

- **Benefits of VXLAN:**

- Loop Free Topology
 - Avoid running STP in your network
 - No disabled links
- ECMP
 - Distribute traffic load among multiple best paths
- Dynamic rerouting on failures
 - Leverage Level3 capabilities and achieve faster rerouting on failures
- Scalability
 - 4096 vs 16 million isolated networks

Internet Exchange (IX): VLAN to VXLAN Conversion

Approaches

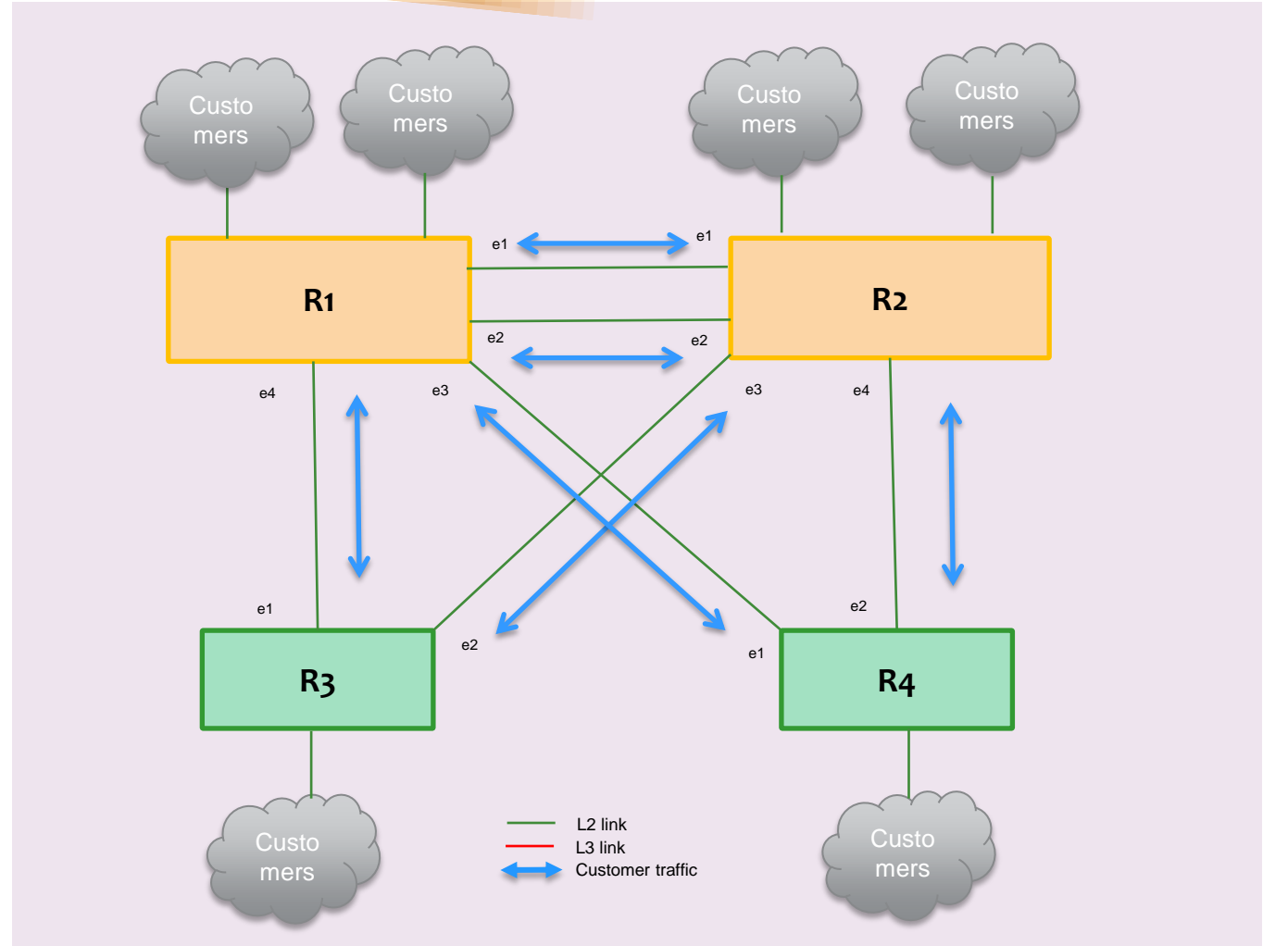
- **Two approaches to deploy VXLAN in your Internet Exchange**
- **Approach 1: Reload with VXLAN changes**
 - Create necessary config file with VXLAN
 - Test it in the lab
 - Deploy in a maintenance window
- **Approach 2: Gradual Conversion**
 - Analyze your topology
 - Create necessary steps to convert to VXLAN
 - Test it in the lab
 - Deploy in a maintenance window

Internet Exchange (IX) – Sample Topology



Topology: MLAG

- Sample Internet Exchange (IX) Topology
- Layer 2 based topology
- R1,R2 are MLAG peers
- R1, R2 are core switches & R3, R4 are leaf switches
- Customers connected on all switches



Internet Exchange (IX): VLAN to VXLAN conversion



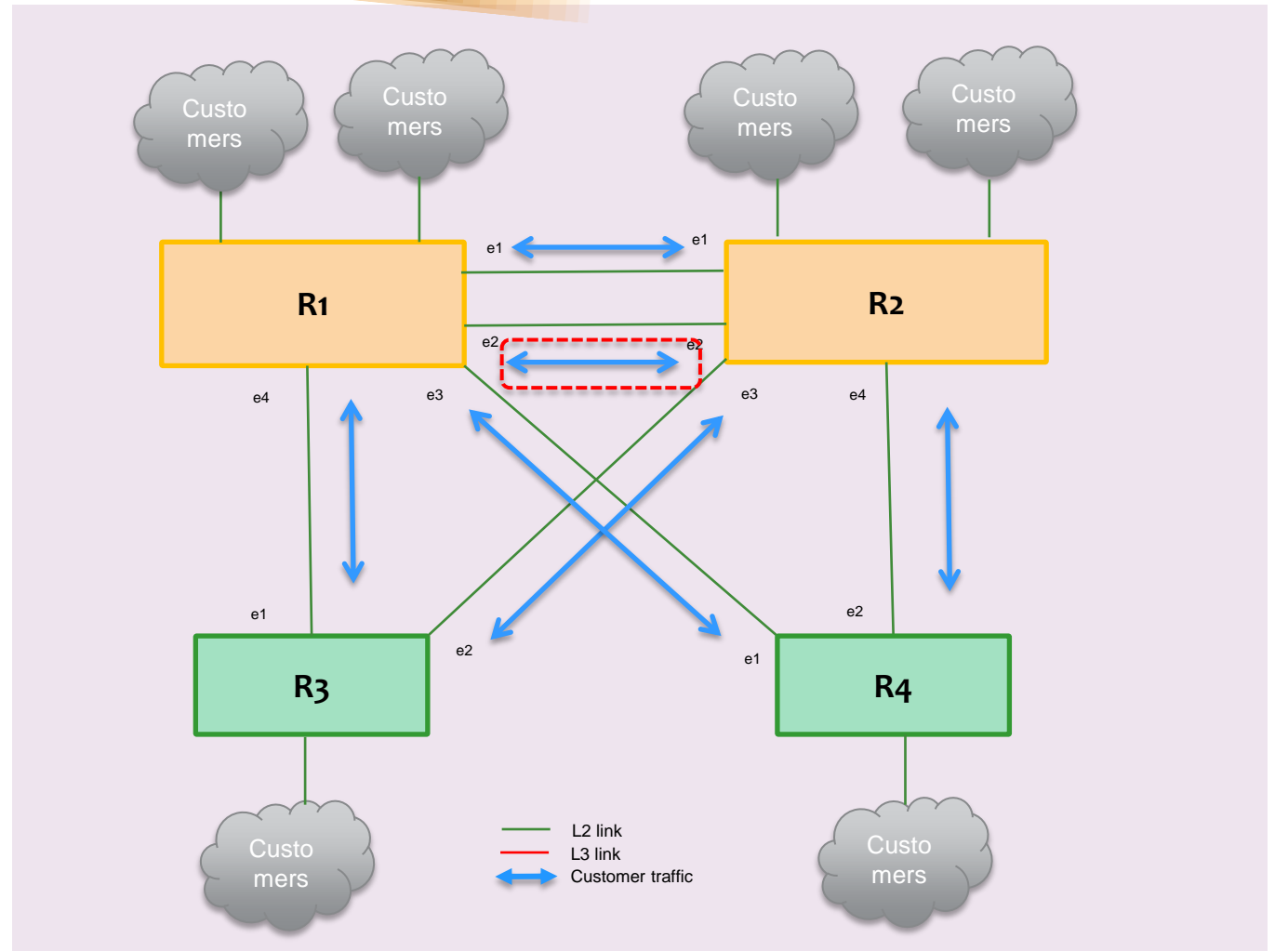
Step 1: Convert Core Trunk link to L3

Step 1

- Ensure Trunk traffic between R1 – R2 is less than 50%
- Shut down interface e2 between R1 – R2
- Remove “channel-group” config on Interface e2
- Configure IP address, OSPF (point2point)
- No shut interface e2

Notes

- Half of trunk links needs to be converted to L3
- Customer Traffic is using non-L3 links
- Small amount of traffic drop expected



Internet Exchange (IX): VLAN to VXLAN conversion



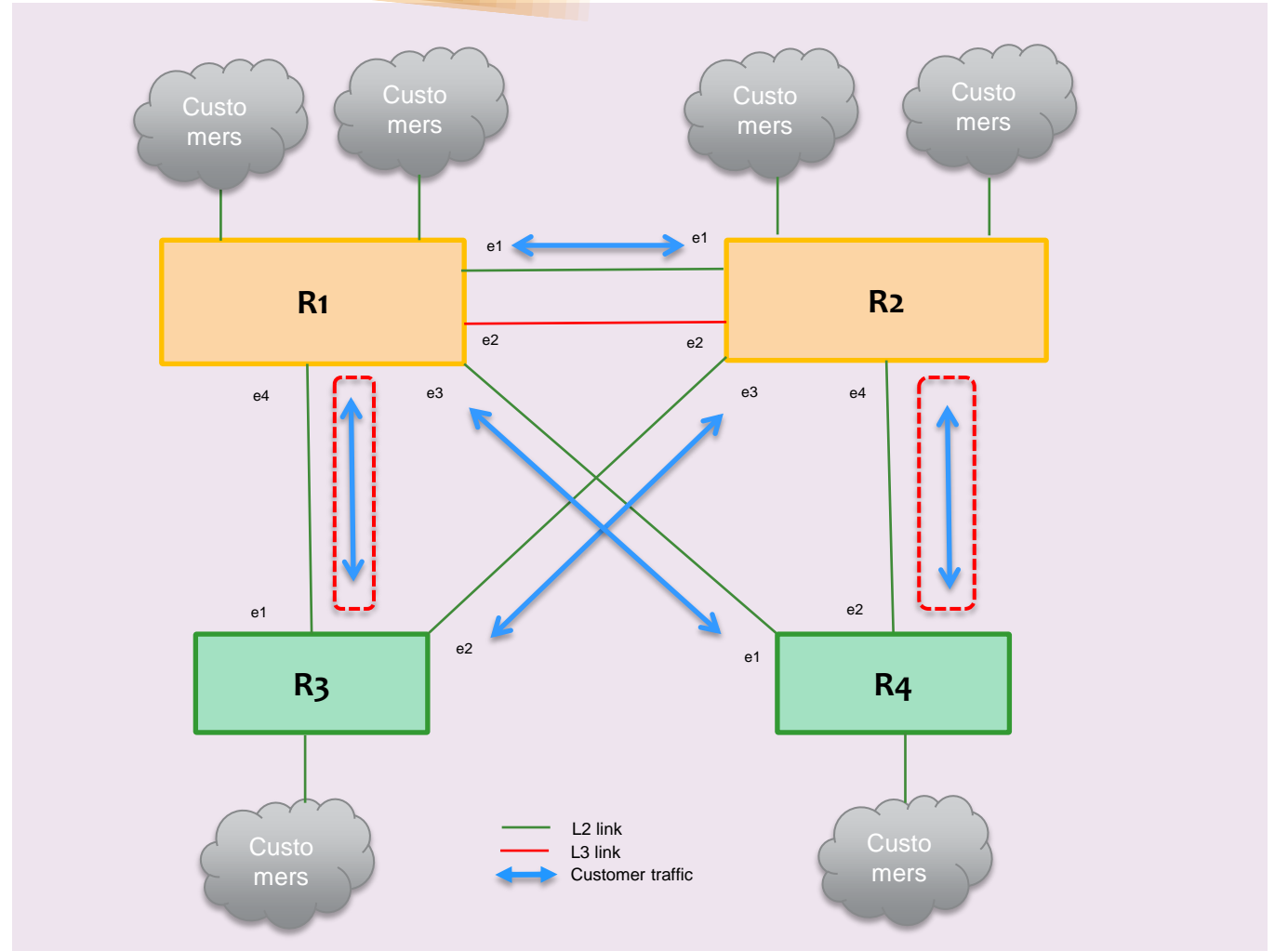
Step 2: Convert uplink links to L3

Step 2

- Convert interfaces R1-R3 & R2-R4 to L3
- Shut down interface between R1-R3 & R2-R4
- Remove “channel-group” config on Interfaces
- Configure IP address, OSPF (point2point)
- No shut interface

Notes

- Customer Traffic is using non-L3 links
- Small amount of traffic drop is expected



Internet Exchange (IX): VLAN to VXLAN conversion



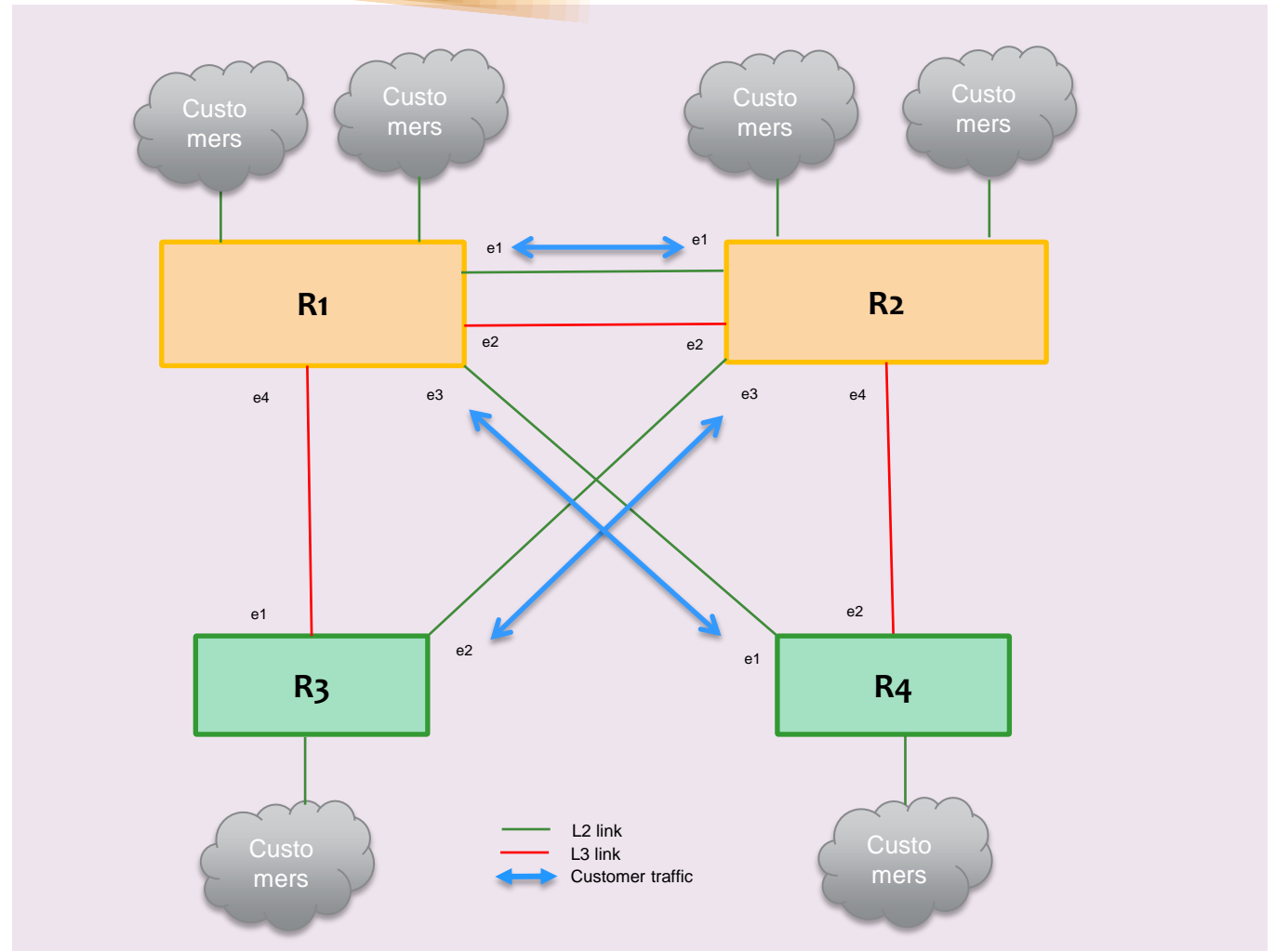
Step 3: Enable IP Routing

Step 3

- Configure Loopback Interfaces on all switches
- Enable OSPF on Loopback Interfaces
- Enable "ip routing"
- Configure OSPF on all Switches
- Check OSPF DB & Routing tables

Notes

- Customer Traffic is using non-L3 links
- No traffic drop is expected



Internet Exchange (IX): VLAN to VXLAN conversion



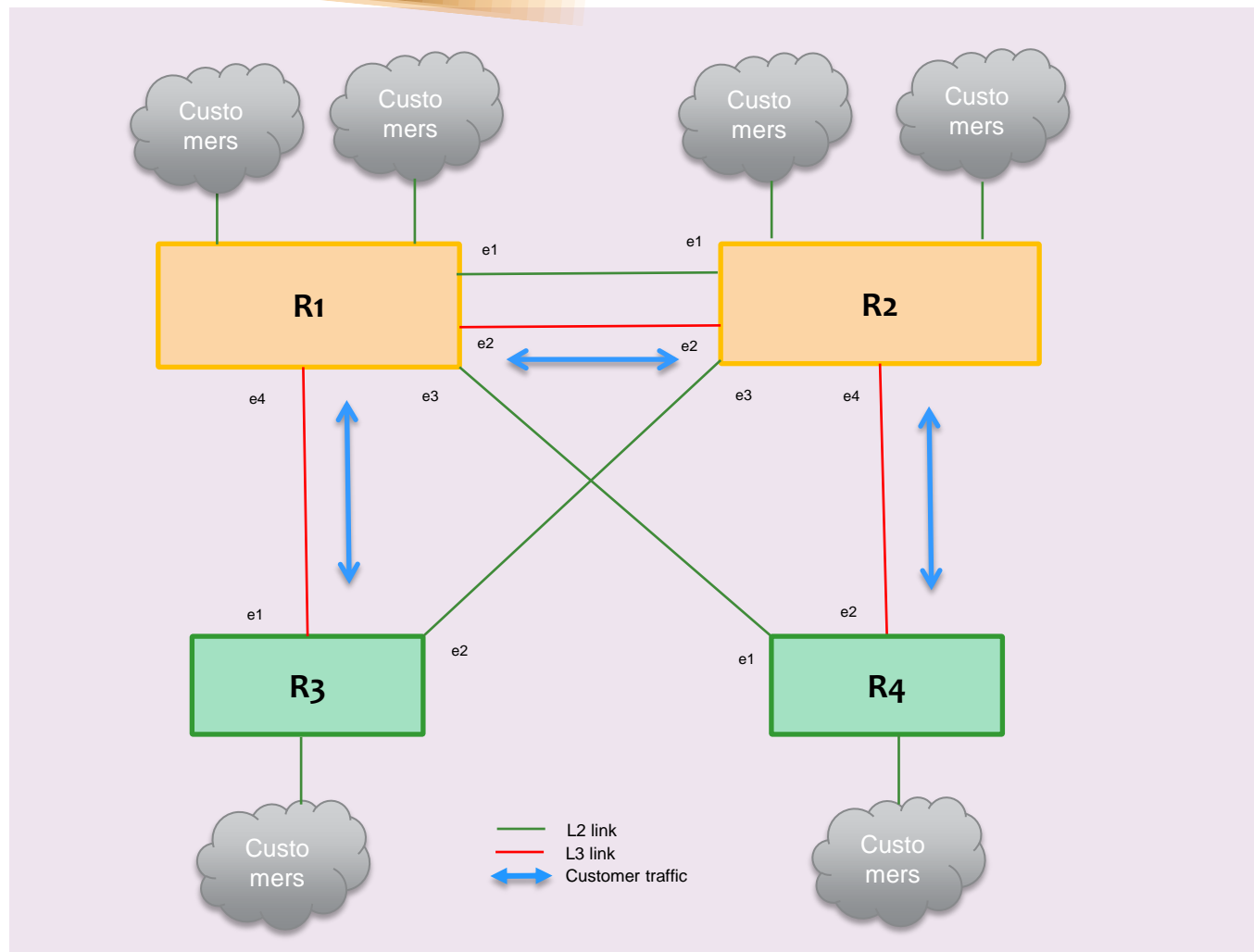
Step 4: Configure VXLAN

Step 4

```
interface Vxlan1
  vxlan source-interface Loopback0
  vxlan udp-port 4789
  vxlan vlan 1 vni 1
  vxlan vlan 1 flood vtep x.x.x.x y.y.y.y
```

Notes

- Traffic drop is expected during transition
- Customer traffic is now using L3 links



Internet Exchange (IX): VLAN to VXLAN conversion



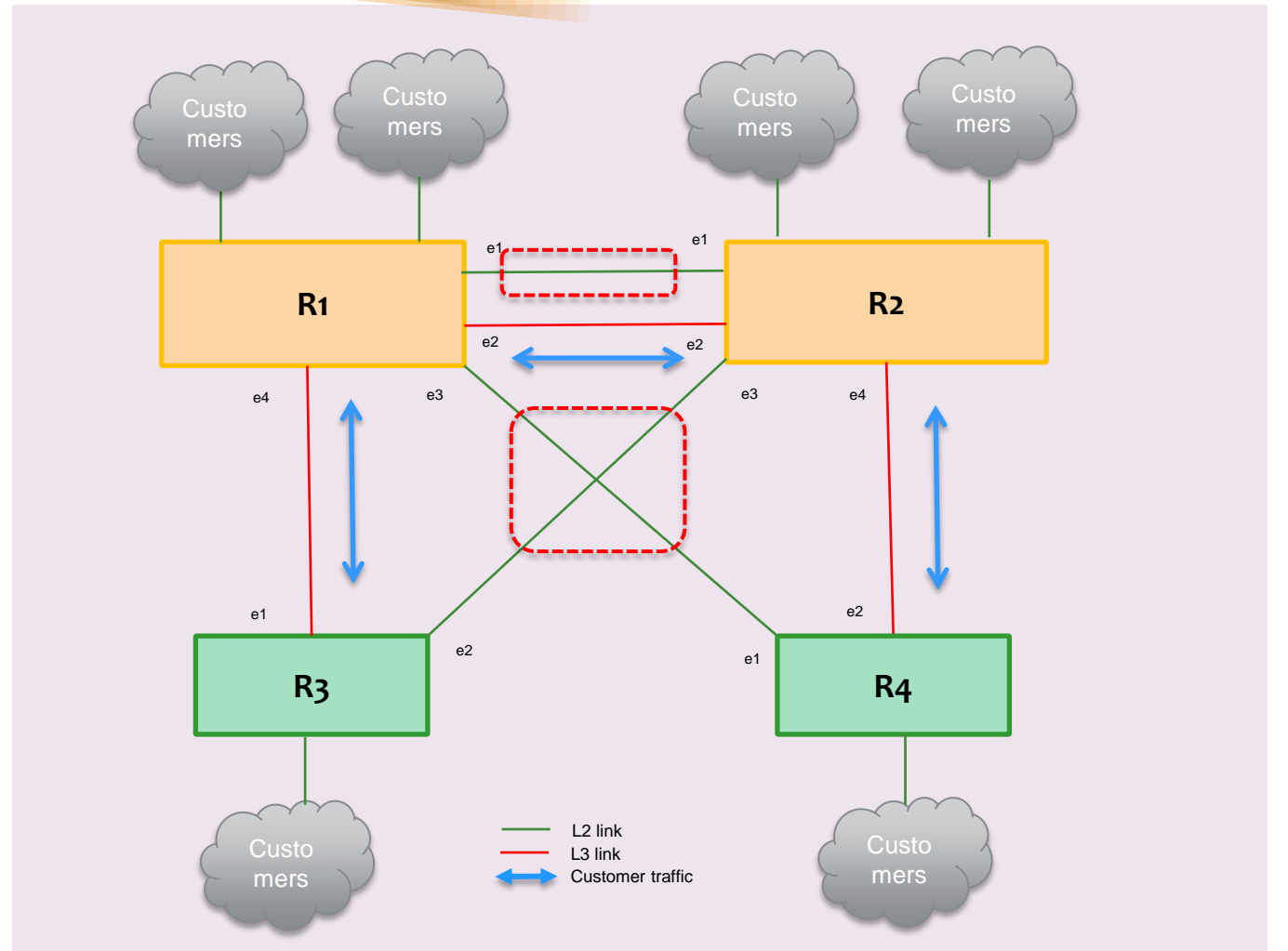
Step 5: Convert remaining links to L3

Step 5

- Convert remaining links to L3
 - Shut down interface
 - Remove “channel-group” config
 - Configure IP address, OSPF (point2point)
 - No shut interface

Notes

- Customer traffic is using L3 links
- No traffic drop is expected



Internet Exchange (IX): VLAN to VXLAN conversion



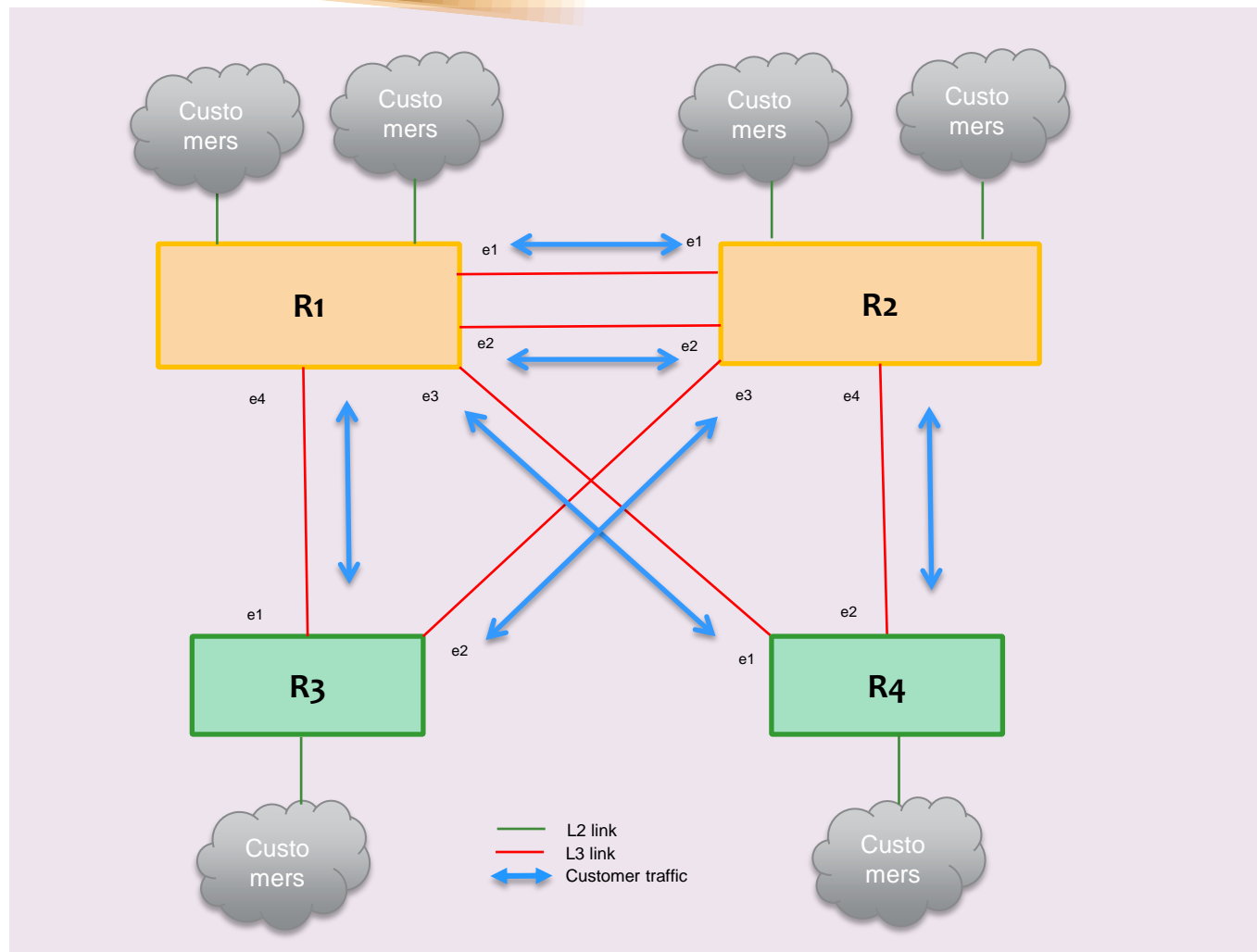
Step 6: Verification of L3, Conversion Complete

Step 6

- Check L3 & VXLAN status on all switches
- Check ECMP & traffic distribution on all switches
- VXLAN Conversion Complete

Notes

- Customer traffic is using L3 links



Internet Exchange (IX): VLAN to VXLAN conversion



Lab Results

Approach 1: Reload

- Saw ~10 mins of traffic drop
- Need to reload all switches simultaneously
- VLAN to VXLAN conversion completed

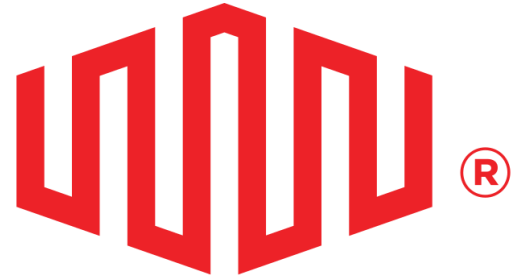
Approach 2: Gradual Conversion

- Saw ~2 mins of traffic drop
- VLAN to VXLAN conversion achieved with minimal customer disruption
- 5 times better 😊

Internet Exchange (IX): VLAN to VXLAN Conversion

Summary

- **Deployment of VXLAN is easier than you think**
- **Customer downtime can be minimized during the conversion**
- **Successfully deployed VXLAN in multiple Equinix IX Metros**



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