draft-smm-bess-alt-labeI-00

Signaling Alternative Labels for BGP Prefixes

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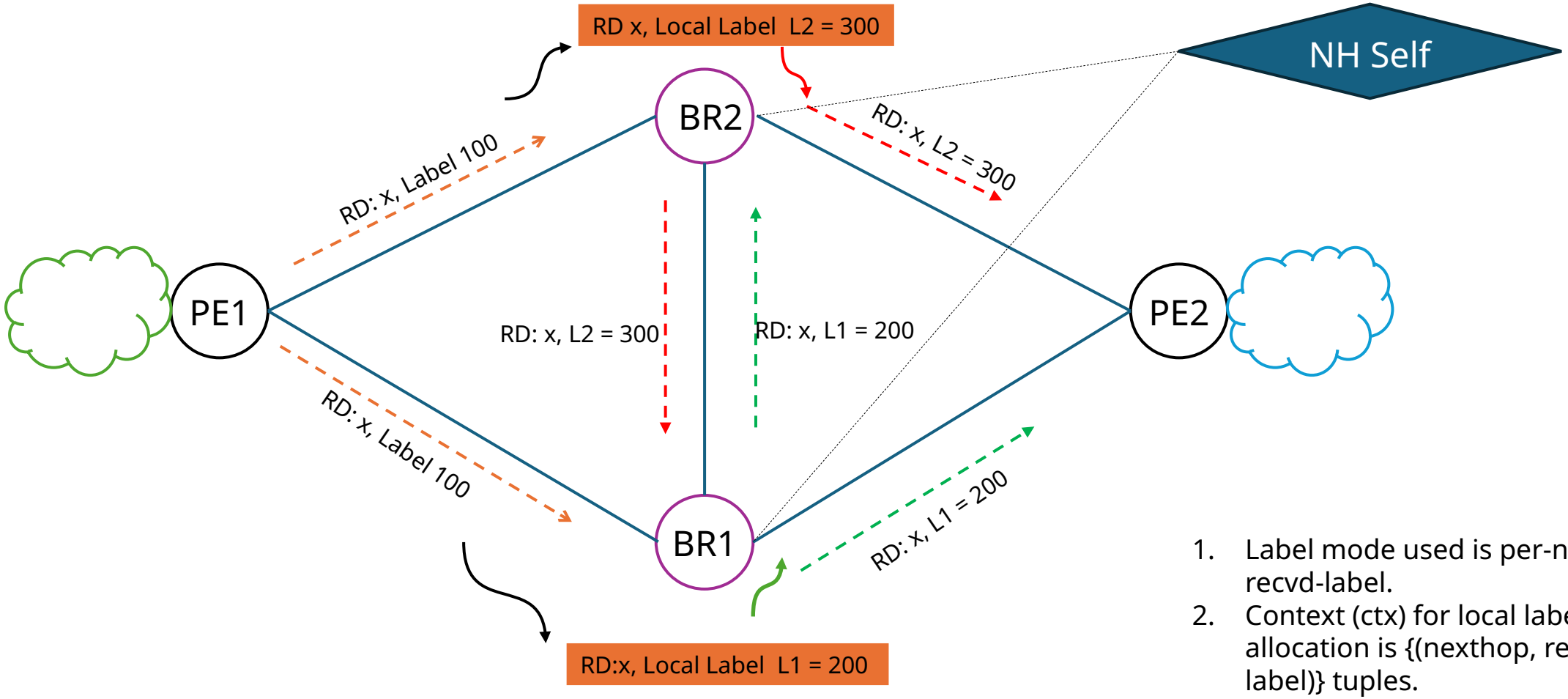
History

- Problem Statement was presented in IETF 123
- There were discussion around multiple solutions , Today presenting one of the solution which had most consensus
- We would prefer to keep discussion in list if there is any question and avoid debate in floor

Label Allocation mode

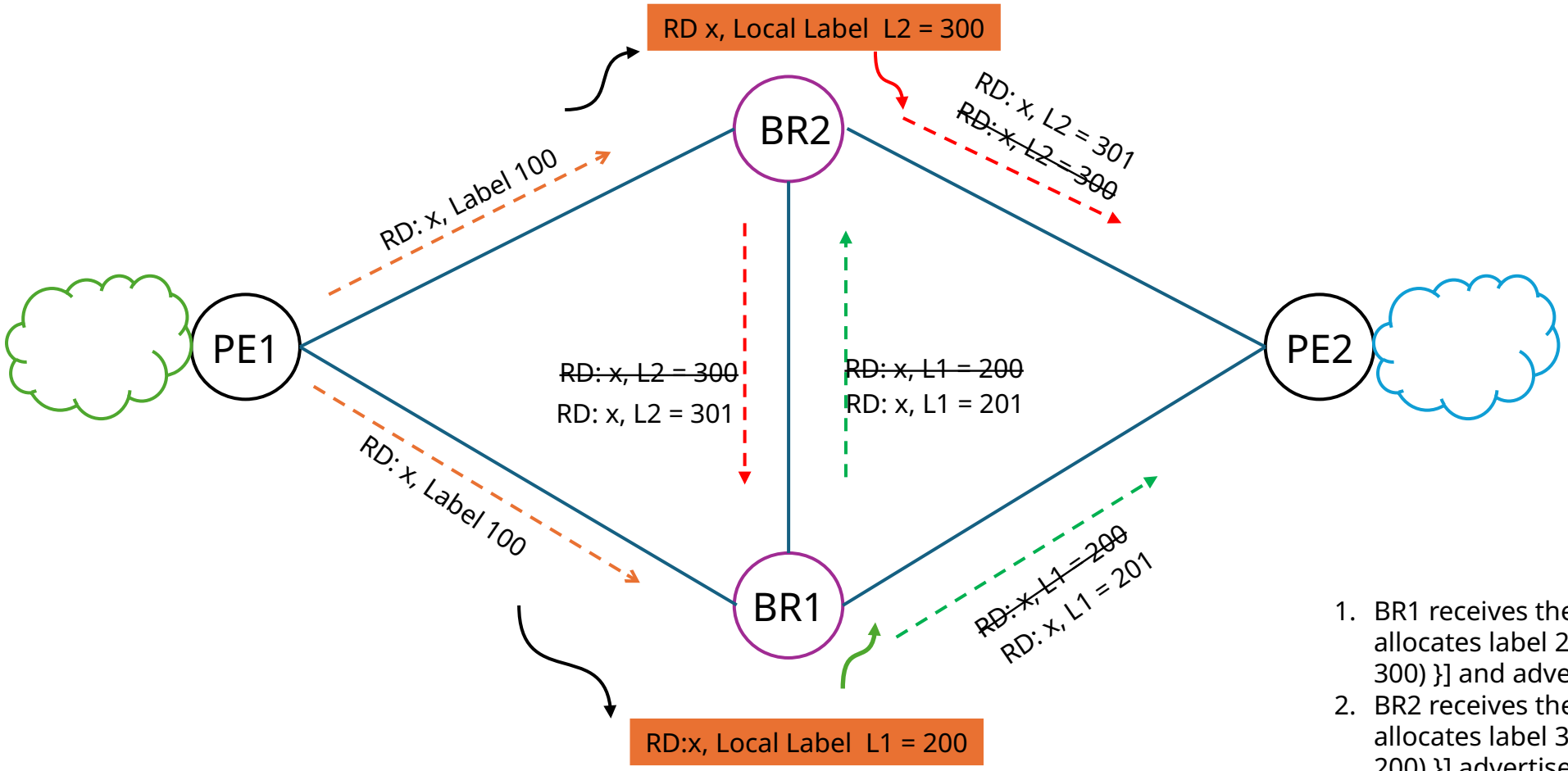
- Allocation mode :
  - per prefix
  - per vrf
  - per next-hop-received-label.
- per next-hop-received-label
  - Label Allocation context for this mode is set of {(nhop, recvd_label)} tuples.
  - Useful to conserve labels at the RR with next-hop-self or ASBR

Base Case



1. Label mode used is per-nexthop-recvd-label.
2. Context (ctx) for local label allocation is {(nexthop, received label)} tuples.
3. Leads to a continuous label allocation issue in symmetric PIC deployments.

Problem



1. BR1 receives the update from BR2, allocates label 201 [ctx {(PE1, 100), (BR2, 300) }] and advertises to BR2
2. BR2 receives the update from RR1, allocates label 301 [ctx {(PE1, 100), (BR1, 200) }] advertises to RR1.
3. This will result in new label allocations at BR1 and BR2 and this process will go on
4. Net result is the devices BR1 and BR2 will engage in a continuous label churn and hit the platform limitations soon

Label signaling – new proposal

- Two possible options
  1. NHC attribute
     - Use a new TLV Type of NHC attribute (draft-ietf-idr-entropy-label)
     - TLV to encode one or more additional labels
     - Label propagation rules are closely aligned with NHC specification
  2. Extended community
     - Define a new extended community to carry additional labels
     - Need to define propagation rules similar to NHC

Solution Overview

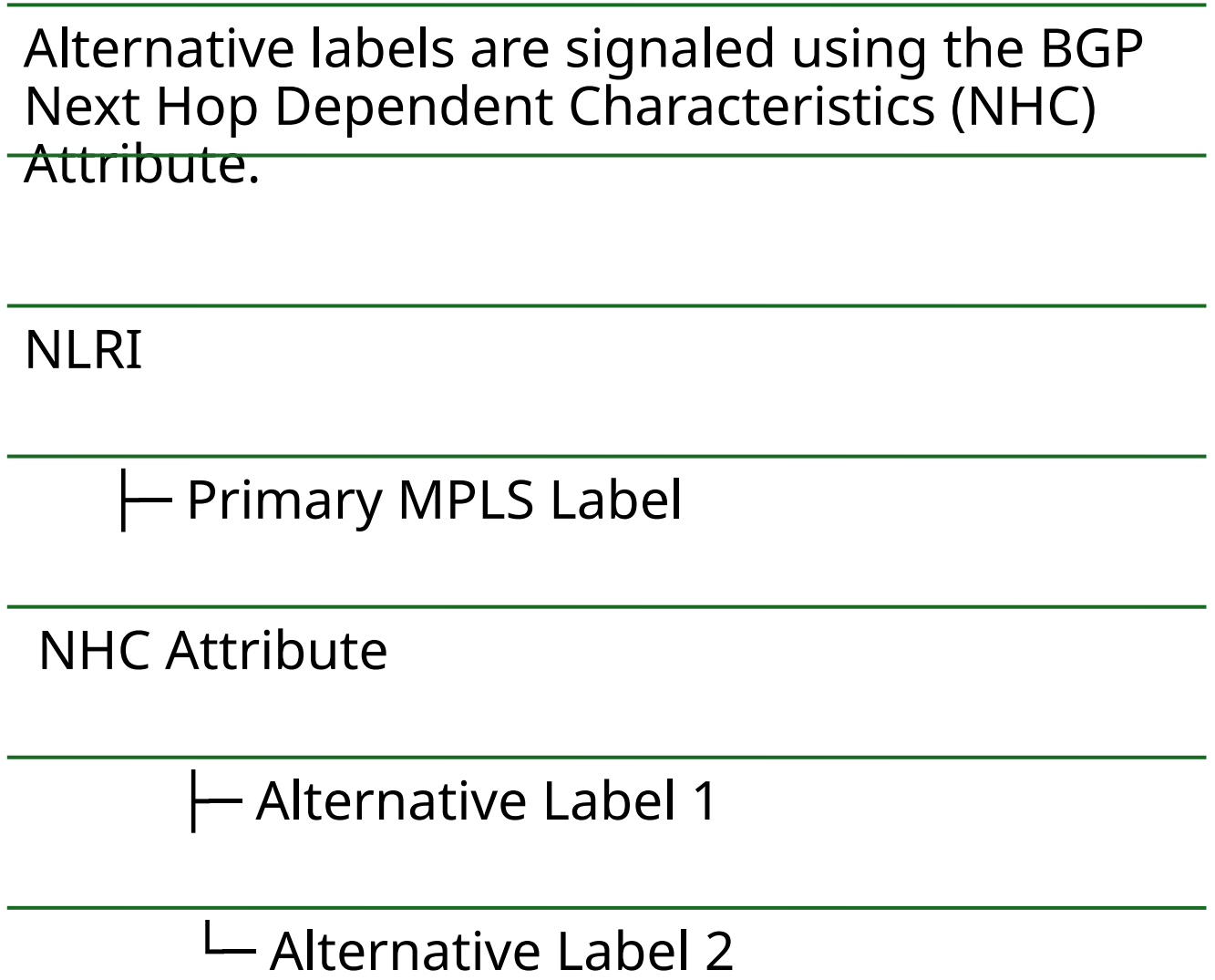
- Introduce Alternative Labels for BGP prefixes.

- A route may advertise:
  - Primary label
  - One or more alternative labels

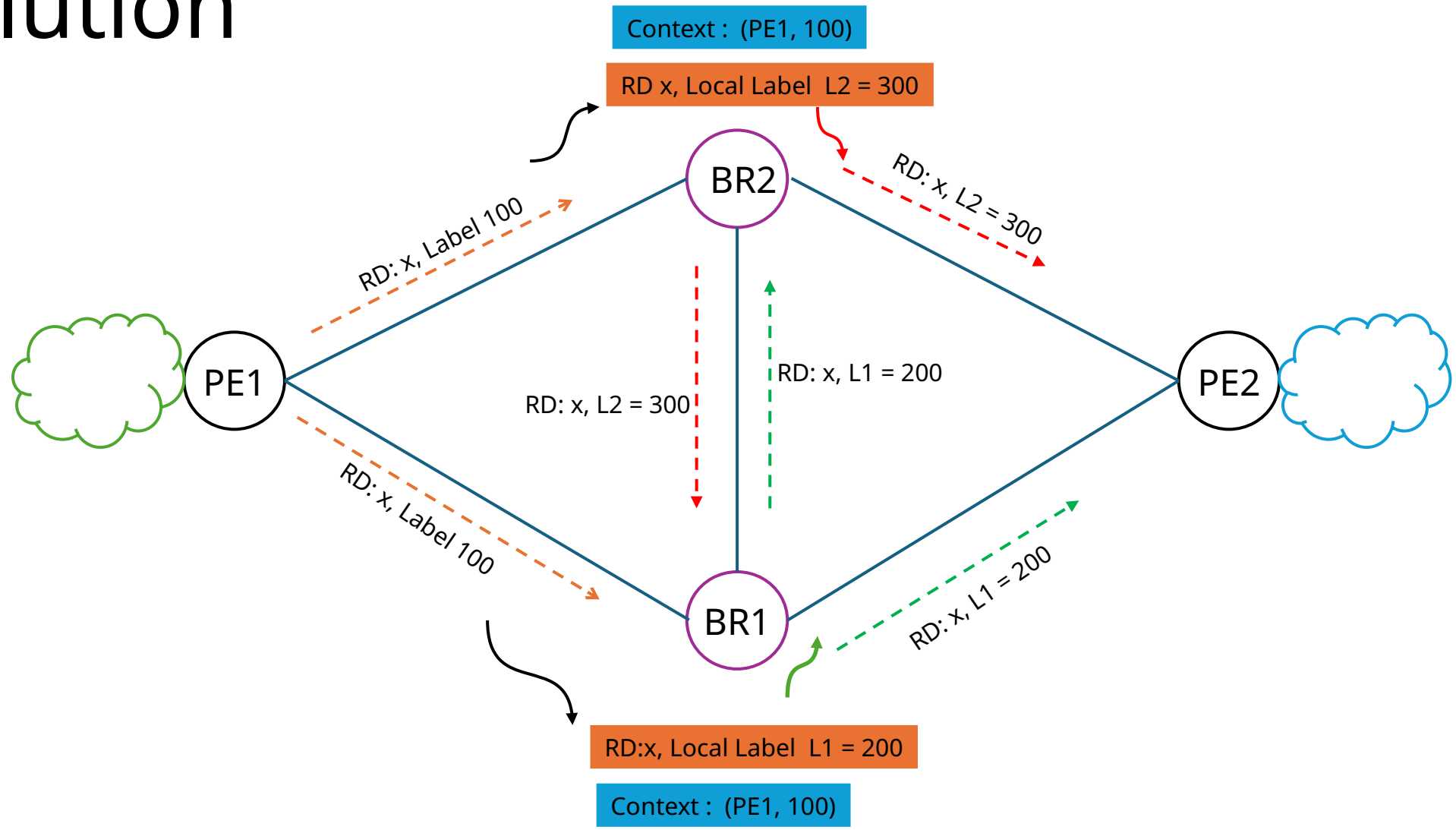
- These labels represent additional forwarding options for the same NLRI.

Signaling Mechanism

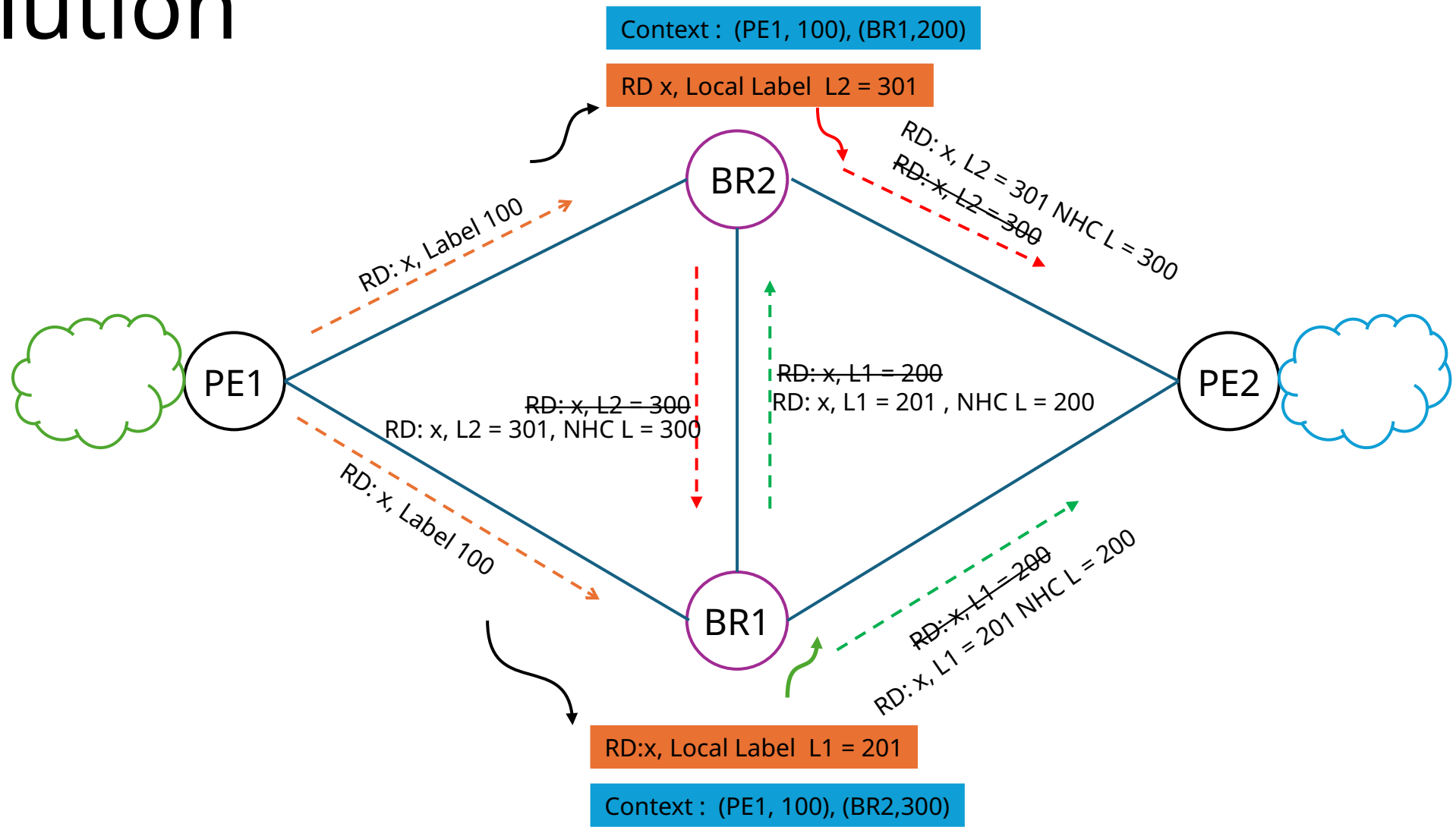
Alternative labels are signaled using the BGP Next Hop Dependent Characteristics (NHC) Attribute.



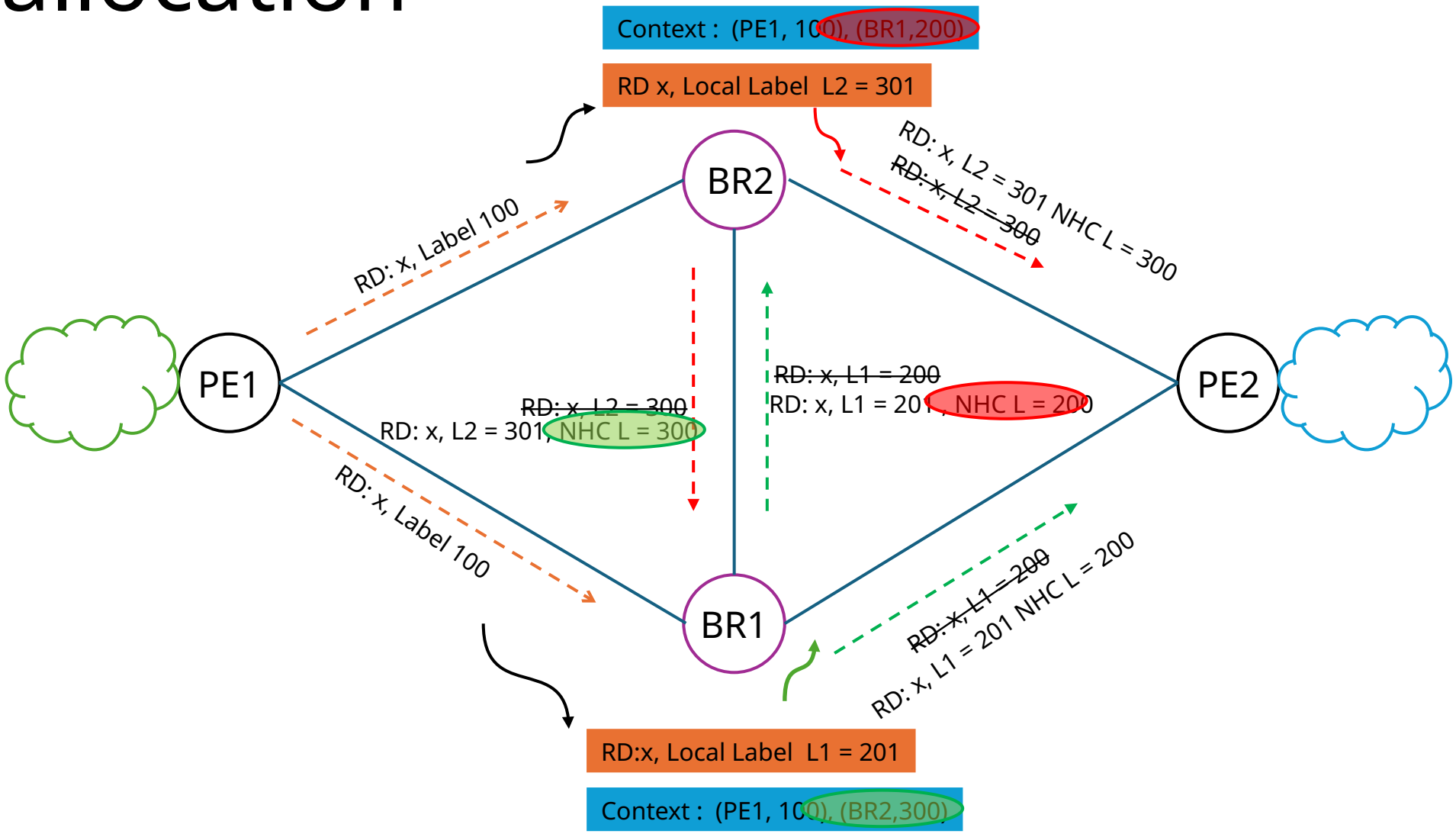
Solution


Context : (PE1, 100)
RD x, Local Label L2 = 300
BR2
RD: x, L2 = 300
RD: x, Label 100
PE1
RD: x, L2 = 300
RD: x, L1 = 200
PE2
RD: x, Label 100
BR1
RD: x, L1 = 200
RD:x, Local Label L1 = 200
Context : (PE1, 100)

Solution


Context : (PE1, 100), (BR1,200)
RD x, Local Label L2 = 301
RD: x, L2 = 301 NHC L = 300
~~RD: x, L2 = 300~~
BR2
RD: x, Label 100
PE1
~~RD: x, L2 = 300~~
RD: x, L2 = 301, NHC L = 300
~~RD: x, L1 = 200~~
RD: x, L1 = 201 , NHC L = 200
PE2
RD: x, Label 100
BR1
~~RD: x, L1 = 200~~
RD: x, L1 = 201 NHC L = 200
RD:x, Local Label L1 = 201
Context : (PE1, 100), (BR2,300)

No Label allocation

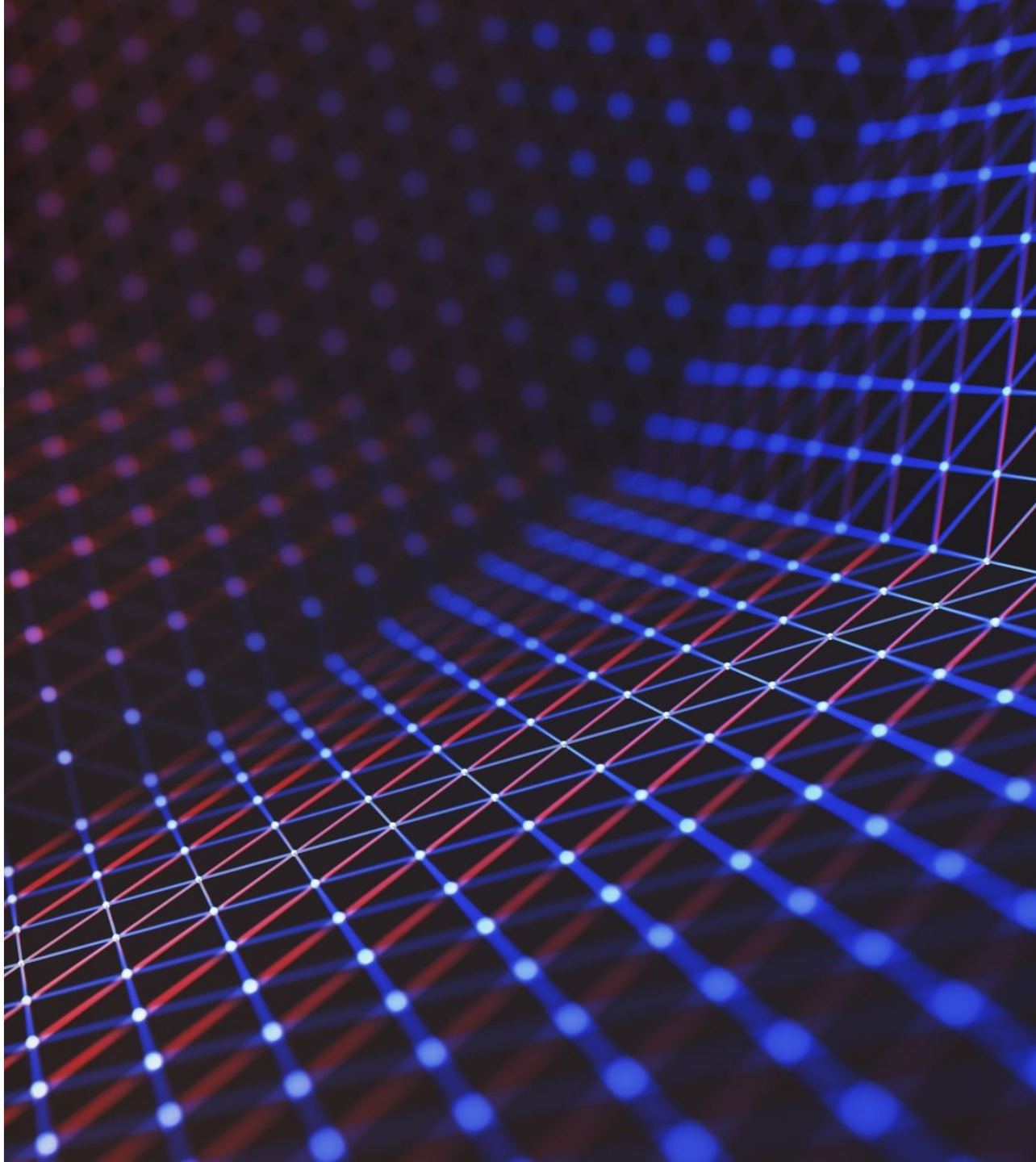


Forwarding Model

- Ingress PE may choose between:
  - Primary label
  - Alternative labels
- Selection can be based on:
  - Policy
  - Traffic type
  - Load balancing
  - Fast reroute

Example Use Cases

Fast Reroute
Alternative labels represent backup paths.
Traffic Engineering
Different labels represent different SR paths.
Service Differentiation
Labels mapped to QoS or service classes.



Benefits

Operational advantages:	- Multiple forwarding behaviors per prefix - Avoids duplicating routes - Leverages existing BGP extensibility
Deployment:	- Incremental rollout - Backward compatible.

Next Step

- Please provide comments