

draft-smm-bess-alt-label-00

Signaling Alternative Labels for BGP Prefixes

IETF 125, March 2026

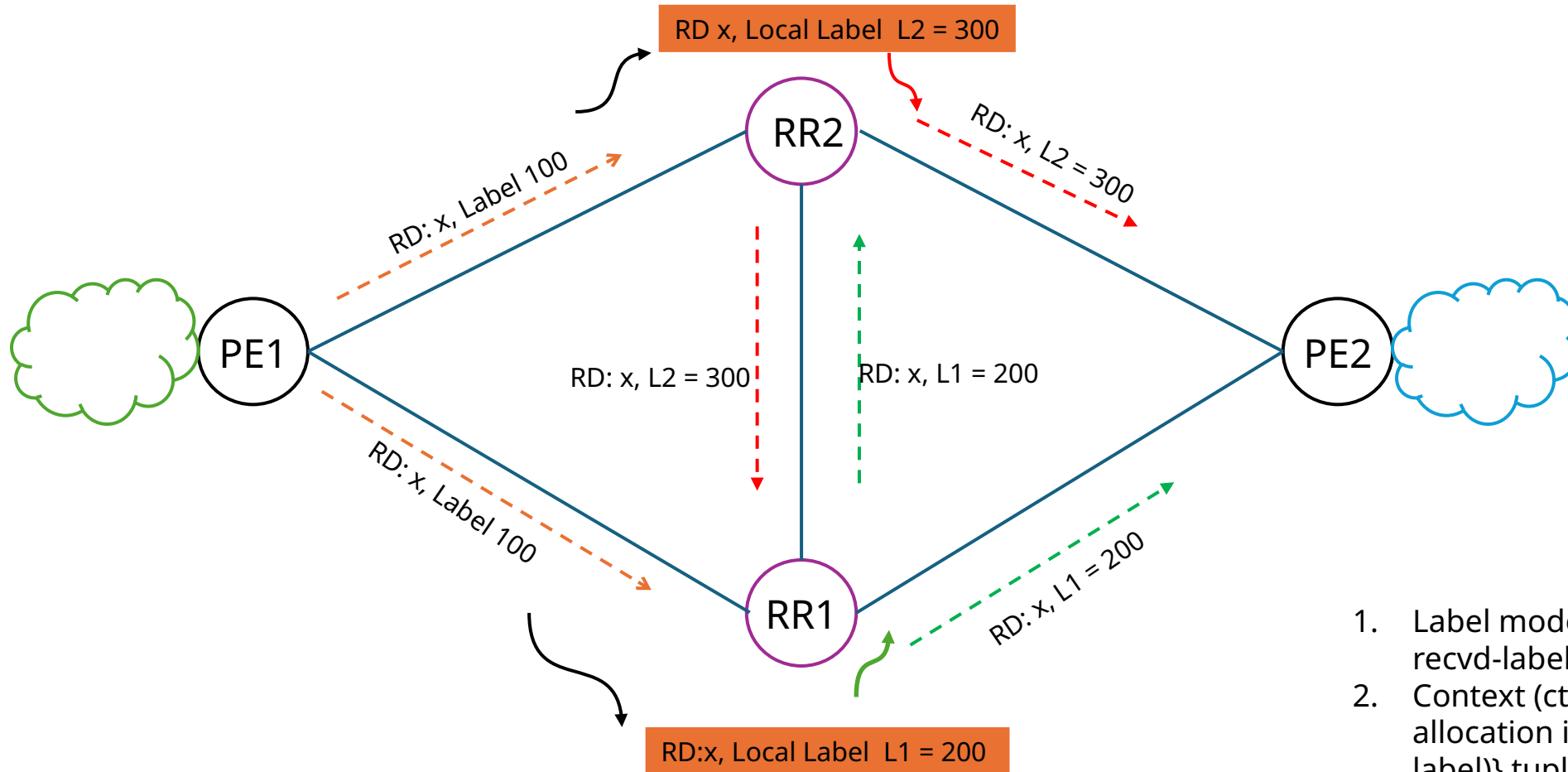
History

- 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

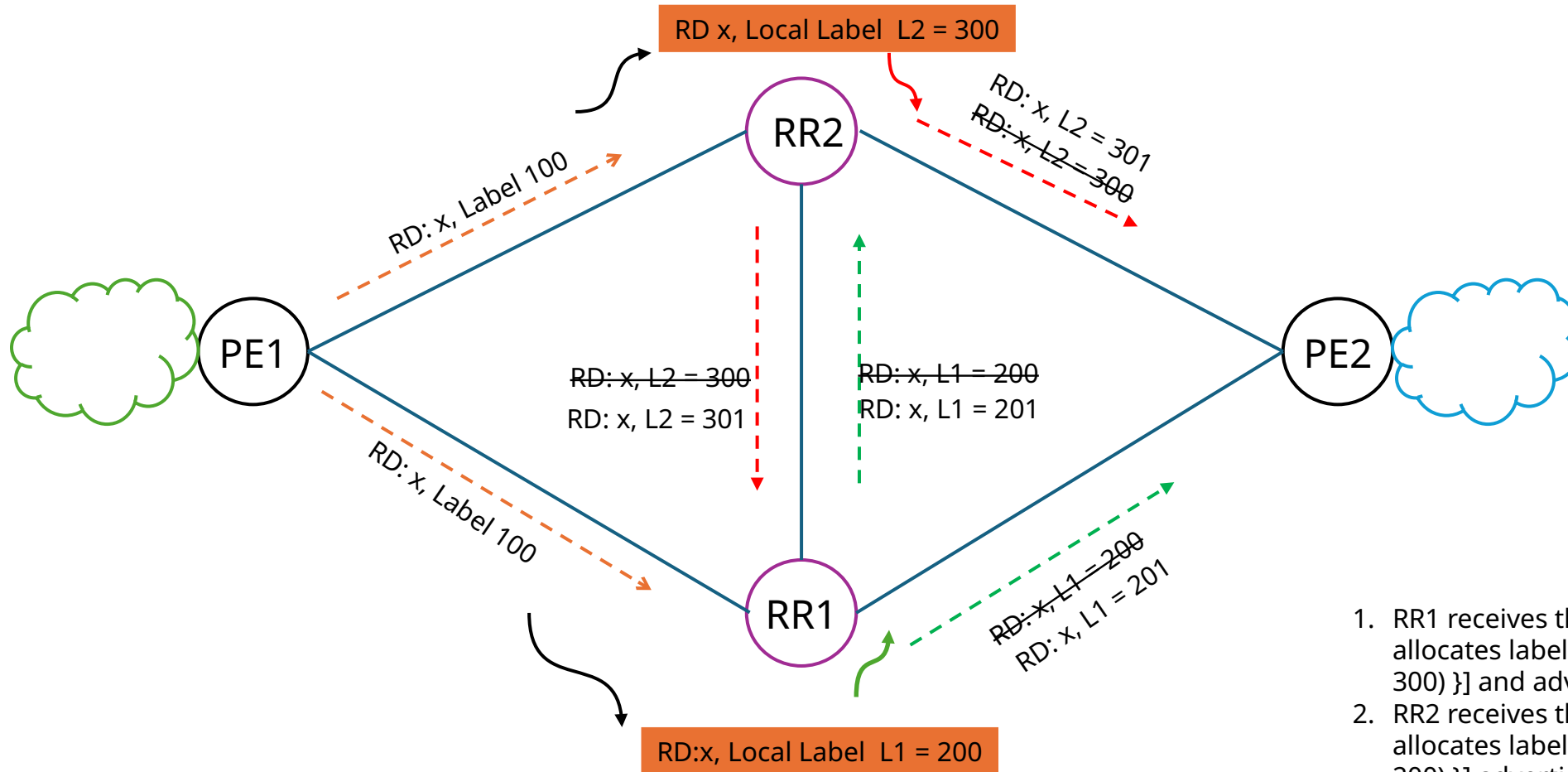
- Allocation mode :
 - per prefix
 - per vrf
 - per next-hop-received-label.
- per next-hop-received-label
 - Label Allocation context for this mode is set of {(nhop, recvd_label)} tuples.
 - Useful to conserve labels at the RR with next-hop-self or ASBR

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. RR1 receives the update from RR2, allocates label 201 [ctx {(PE1, 100), (RR2, 300)}] and advertises to RR2
2. RR2 receives the update from RR1, allocates label 301 [ctx {(PE1, 100), (RR1, 200)}] advertises to RR1.
3. This will result in new label allocations at RR1 and RR2 and this process will go on
4. Net result is the devices RR1 and RR2 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.

NLRI

└ Primary MPLS Label

└ NHC Attribute

└ Alternative Label 1

└ Alternative Label 2

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