

Network Assigned Upstream Label

draft-beeram-ccamp-network-assigned-upstream-label

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Introduction

- As per existing setup procedures outlined for a Bidirectional LSP (RFC3473), each upstream-node MUST allocate a valid upstream-label on the outgoing interface before sending the initial PATH downstream.
- Need a mechanism to enable a given node to offload the task of assigning the upstream-label for a given Bidirectional LSP onto the network.
 - There are certain scenarios (use-case discussed in later slides) where it is not desirable or possible for a given node to pick the upstream-label on its own.

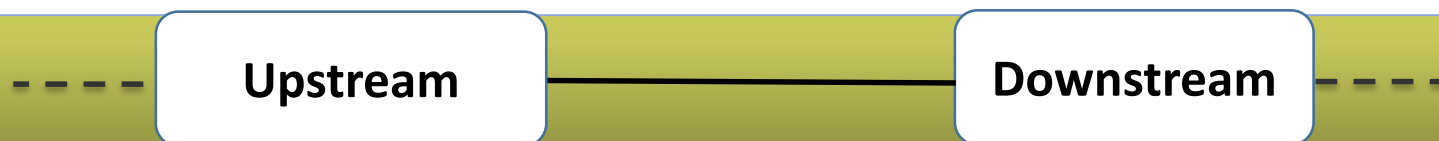
Symmetric Labels

- As per RFC3473, the upstream-label and the downstream-label for a bidirectional LSP at a given hop need not be the same.
- Undocumented Fact: In practice, LSC (Lambda Switch Capable) LSPs always have symmetric labels at each hop along the path of the LSP.*
- Since the use-case discussed in the draft pertains to LSC Labels, the mechanisms discussed in this draft assume “Label Symmetry” by default.
 - The proposed mechanisms are meant to be used only for Bidirectional LSPs that assign symmetric labels at each hop along the path of the LSP.

* This really needs to get documented somewhere.

Unassigned Upstream Label

- Special Label Value - “0xFFFFFFFF” - defined to indicate an Unassigned Label.
 - Presence of this value in the UPSTREAM_LABEL of a PATH indicates that the upstream-node has not assigned an upstream label on its own and has requested the downstream-node to provide a label that it can use in both forward and reverse directions.
- Processing Rules:
 - When the upstream-node is not in a position to pick the upstream label on its own, it sends a PATH downstream with an Unassigned Upstream Label and requests the downstream node to provide a symmetric label.
 - MAY include LABEL_SET to specify limitations.
 - In response, the downstream-node picks an appropriate symmetric label and sends it via the LABEL object in the RESV. If the downstream node cannot pick the symmetric label, it MUST issue a PATH-ERR (Routing Problem/Unacceptable Label Value).
 - The upstream-node will continue to signal the Unassigned Upstream Label in the PATH message even after it receives an appropriate symmetric label in the RESV.
 - This is to make sure that the downstream node would pick a symmetric label if and when it needs to change the RESV label at a later point in time.



Path Upstream Label (Unassigned)
Label-Set (L1, L2 ... Ln)



Resv Label (Assigned – L2)



Unassigned Upstream Label: Backwards Compatibility

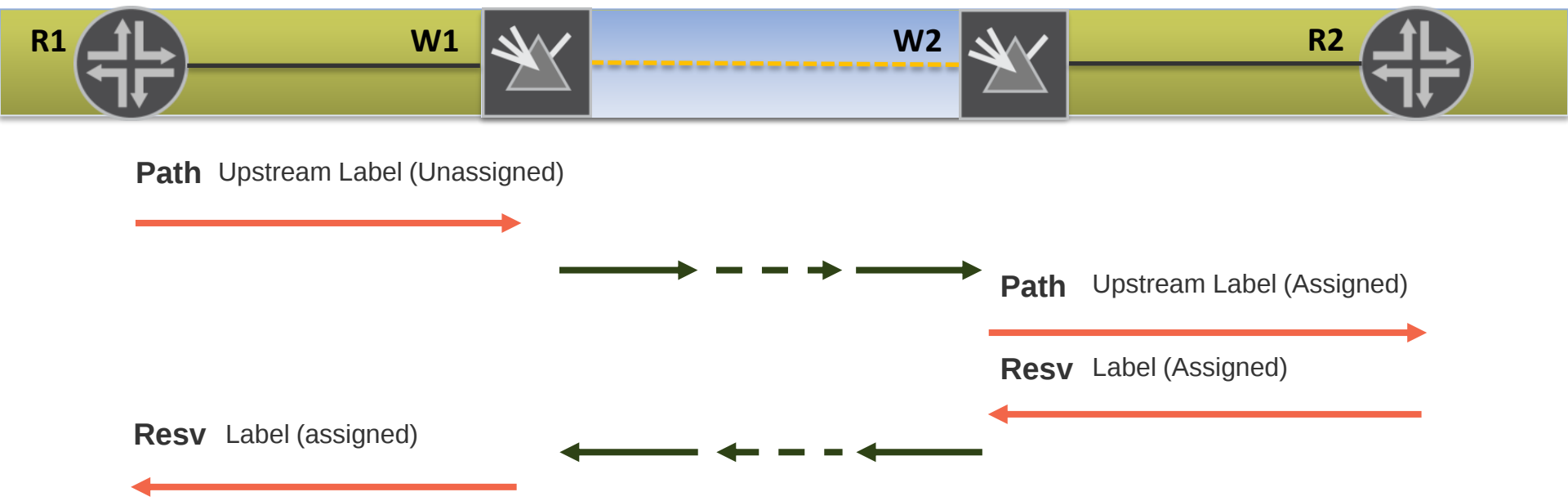
- If the downstream-node is running an older implementation and doesn't understand the semantics of an Unassigned Upstream Label, it will either:
 - (a) Reject the special label value and generate an error. (or)
 - (b) Accept it and treat it as a valid label.
- If (a), then there are obviously no compatibility issues.
- If (b), then there could be some potential issues.
 - But since the use-case discussed in the draft pertains to LSC LSPs, it is safe to assume that this behavior will not get exhibited.

Use-Case : Alien Wavelength Setup



- Optical signal originating on Router R1 tuned to a particular wavelength; It gets multiplexed on WDM-Node W1 with optical signals at other wavelengths.
- It may not be acceptable to have the router send signal into the optical network unless it is at the appropriate wavelength.
 - Having the router send signal with an inappropriate wavelength may adversely impact existing optical trails.
 - If the clients do not have full visibility into the optical network, they are not in a position to pick the correct wavelength up-front.

Alien Wavelength Connection – Initial Setup



- R1 does not have enough information to pick an appropriate client wavelength. It sends a PATH downstream requesting the network to assign an appropriate symmetric label for it to use. Since the client wavelength is unknown, the laser is off at R1.
- The network receives the PATH, chooses the appropriate wavelength values and forwards them in appropriate label fields to R2.
- R2 receives the PATH, turns the laser ON and tunes it to the appropriate wavelength (received in the UPSTREAM_LABEL/LABEL_SET of the PATH) and sends out a RESV upstream
- The RESV received by R1 carries a valid symmetric label in the LABEL object. R1 turns on the laser and tunes it to the wavelength specified in the network assigned symmetric label.

Alien Wavelength Connection – Wavelength Change

- After the LSP is set up, the network MAY decide to change the wavelength for the given LSP. This could be for a variety of reasons - policy reasons, restoration within the core, preemption etc.
- If the ingress client receives a changed label via the LABEL object in a RESV modify, it MUST retune the laser at the ingress to the new wavelength.
- Similarly, if the egress client receives a changed label via UPSTREAM_LABEL/LABEL_SET in a PATH modify, it must retune the laser at the egress to the new wavelength.

Thank You