

A Framework of MPLS Global Label

draft-li-mpls-global-label-framework-02

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Updates of draft-li-mpls-global-label-usecases

- Add one co-author: Robert Raszuk
- Merge content from [I-D.raszuk-mpls-domain-wide-labels]
- Update the use cases according to latest progress
 - MPLS OAM for LDP LSP
 - Service Chaining
 - Segment Routing
- Clarify the problem for the use cases
 - VPLS Multicast over MP2MP
 - EVPN
- Modify the description for the use cases
 - Identification of MVPN/VPLS: Both upstream label allocation and central controlled label allocation can be used for global label.

Updates of draft-li-mpls-global-label-framework

- Add one co-author: Robert Raszuk
- Merge content from [I-D.raszuk-mpls-domain-wide-labels]
- Refine the draft according to latest progress

Framework of MPLS global label

- [I-D.li-mpls-global-label-usecases] proposes possible use cases of MPLS global label. MPLS global label can be used for:
 - identification of the location
 - identification of the service
 - identification of the network
- The framework of MPLS global label includes:
 - Definition of MPLS global label
 - Label allocation methods for MPLS global label
 - Representation of MPLS global label
 - Control plane for MPLS global label
 - Data plane for MPLS global label

Definition of MPLS Global Label

- MPLS global label is the label which meaning can be understood by all nodes or part of nodes in the network. These nodes can be nodes in one domain or nodes spanning multiple domains
 - Special-Purpose MPLS label: Such labels have specific well-known meaning and can be understood by all MPLS nodes.
 - Domain Wide Labels: Domain Wide Labels may be only understood by all nodes or part of nodes in one domain or multiple domains.

MPLS Global Label Allocation Methods

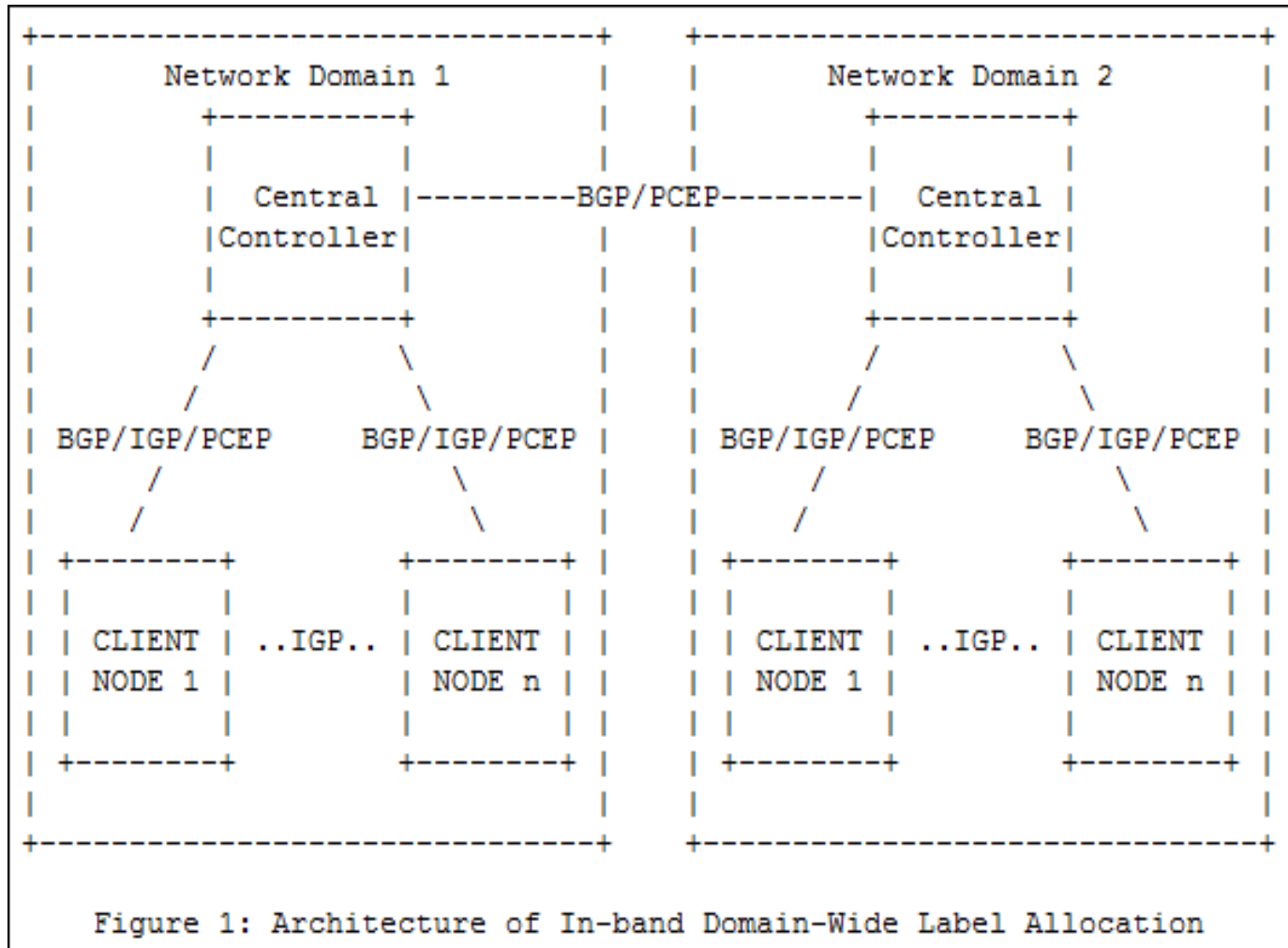
- Special-Purpose MPLS Label
 - [RFC7274] defines the label allocation and retirement through IANA.
- Domain Wide Labels
 - Out-of-band label allocation: manual planning
 - ✓ Static configuration of global label
 - ✓ Typical scenario: Segment routing
 - In-band label allocation: dynamic assignment through control protocols
 - ✓ Typical example: upstream MPLS label assignment defined in [RFC5331]
- This document focuses on the domain wide labels. In this document, the global label always means Domain Wide Label.

Representation of MPLS Global Label

- Per-platform Label Space
 - Pros: Reuse the existing forwarding plane.
 - Cons: Need to prevent the confliction between the global labels allocated in controller and local labels allocated in network devices by existing MPLS protocols (LDP/BGP/RSVP-TE).
- Context-Specific Label Space
 - Two methods to determine the Context Identifier for the global label space:
 - ✓ Service-specific Context Identifier: Service -specific label space
 - ✓ MPLS Global Label Indicator: Well-known label space
 - Pros: Prevent the label confliction
 - Cons: Need to enhance the existing MPLS forwarding mechanism.

Control Plane for MPLS Global Label

- Architecture of In-band Domain-Wide Label Allocation

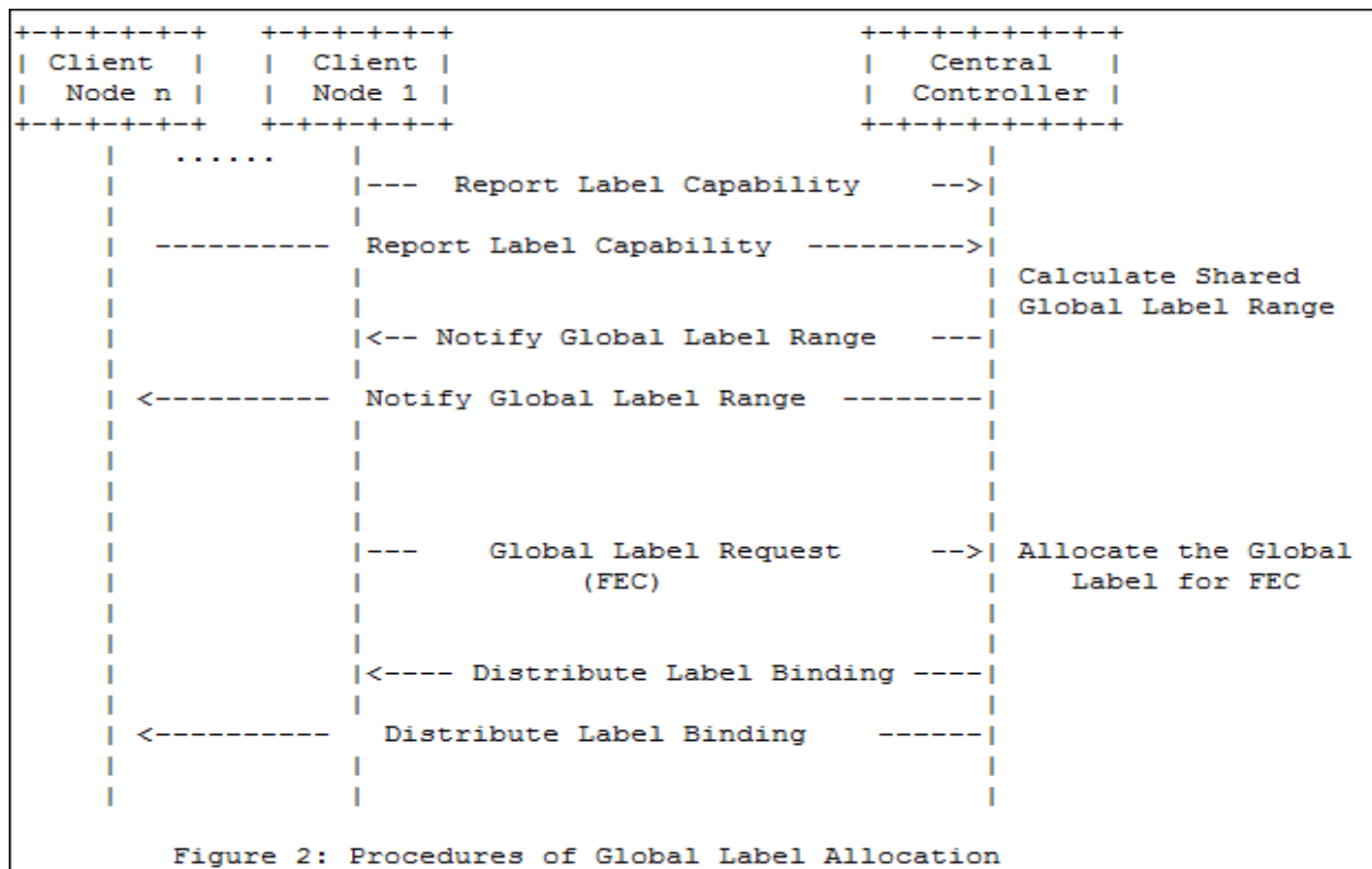


Control Plane for MPLS Global Label

- In the architecture the central controller is responsible for allocating the global labels and advertising to the client nodes in the network.
 - In-Band Global Label Allocation:
 - Label Allocation in Per-Platform MPLS Label Space
 - Label Allocation in Context-Specific Label Space
 - Label mapping distribution
 - From the controller to the connected client nodes
 - From the connected client nodes to unconnected client nodes
 - Inter-Domain label negotiation
 - Protocol extensions requirement to support label allocation and distribution:
 - IGP Protocol Extensions
 - BGP Protocol Extensions
 - PCEP Protocol Extensions

Label Allocation Procedures for MPLS Global Label

- Label Allocation in Per-Platform MPLS Label Space



- Label Allocation in Context-specific MPLS Label Space: Shared label segment negotiation can be saved.

Label Mapping Distribution for MPLS Global Label

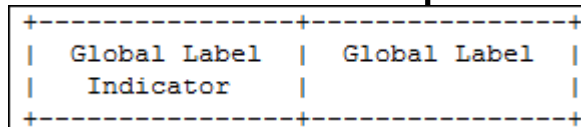
- Label Mapping Distribution
 - From the controller to the connected client nodes: If the central controller connects to all involved nodes, the label mapping can be directly advertised to these nodes.
 - From the connected client nodes to unconnected client nodes: If the central controller only connects part of the involved nodes, the label mapping should be distributed to other client nodes by the clients nodes which receive the label mapping from the central controller.

Protocol Extensions Requirements

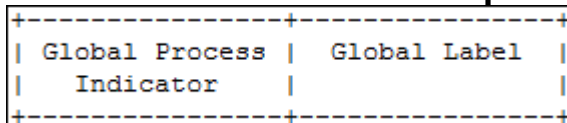
- IGP Protocol Extensions
 - REQ 01. Report Label Capability from client nodes to the central controller.
 - REQ 02. Notify the shared global label range from the central controller to client nodes.
 - REQ 03: Distribute label mapping from the central controller to client node.
 - REQ 04: Distribute label mapping among client nodes.
- BGP Protocol Extensions
 - REQ 11. Report Label Capability from client nodes to the central controller.
 - REQ 12. Notify the shared global label range from the central controller to client nodes.
 - REQ 13: Send global label request from client nodes to the central controller.
 - REQ 14: Distribute label mapping from the central controller to client node.
 - REQ 15: Inter-domain global label negotiation
- PECP Protocol Extensions
 - REQ 21. Report Label Capability from client nodes to the central controller.
 - REQ 22. Notify the shared global label range from the central controller to client nodes.
 - REQ 23: Send global label request from client nodes to the central controller.
 - REQ 24: Distribute label mapping from the central controller to client node.
 - REQ 25: Inter-domain global label negotiation

Data Plane for MPLS Global Label

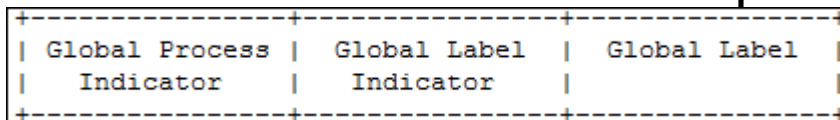
- Global Label in Per-Platform Label Space
 - Without modification
- Global Label in Context-Specific Label Space



- Global Process of Inner Global Label
 - A special-purpose label which is named as Global Process Indicator (GPI) is introduced to indicate that the next global label to GPI SHOULD be processed by each node along the path. Such method can reduce the depth of label stack.
 - allocated from the per-platform label space



- allocated from the Context-Specific label space



Next Steps

- Solicit more comments and feedbacks.
- Revise the draft.