# Segment Routing IS-IS Extensions

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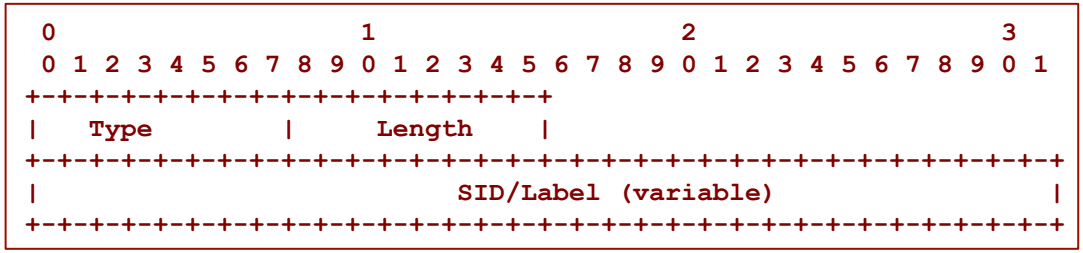
**draft-previdi-isis-segment-routing-extensions-04.txt**

# SR ISIS Extensions

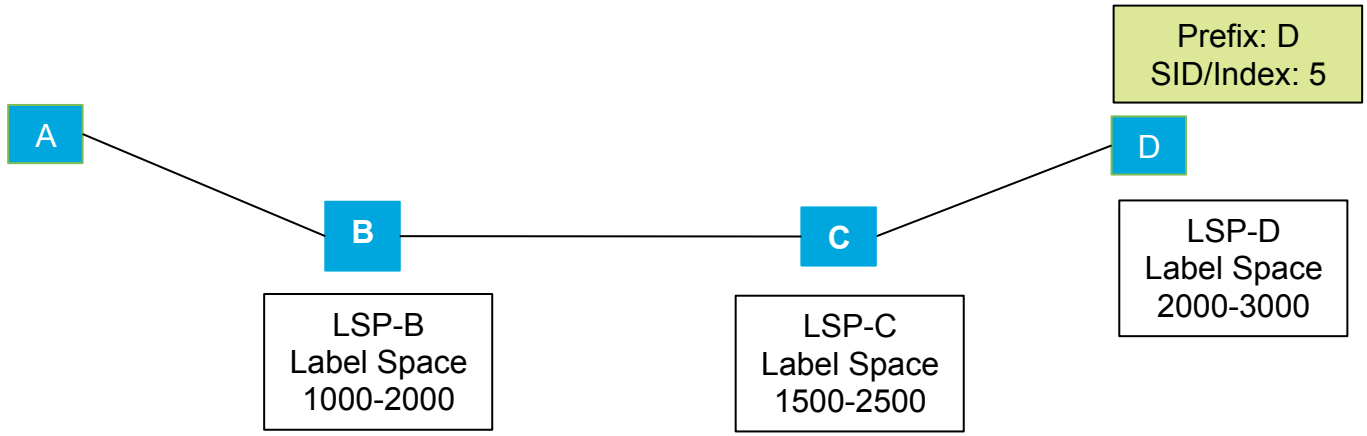
- Describe new TLVs and SubTLVs advertising Segment Routing capabilities and Segment Routing Identifiers
  - According to Segment Routing architecture described in draft-filsfils-rtgwg-segment-routing-01.txt
- Companion drafts have been submitted in OSPF and PCE working groups
  - draft-psenak-ospf-segment-routing-extensions-03.txt
  - draft-psenak-ospf-segment-routing-ospfv3-extension-00.txt
  - draft-sivabalan-pce-segment-routing-02.txt

# SID/Label SubTLV



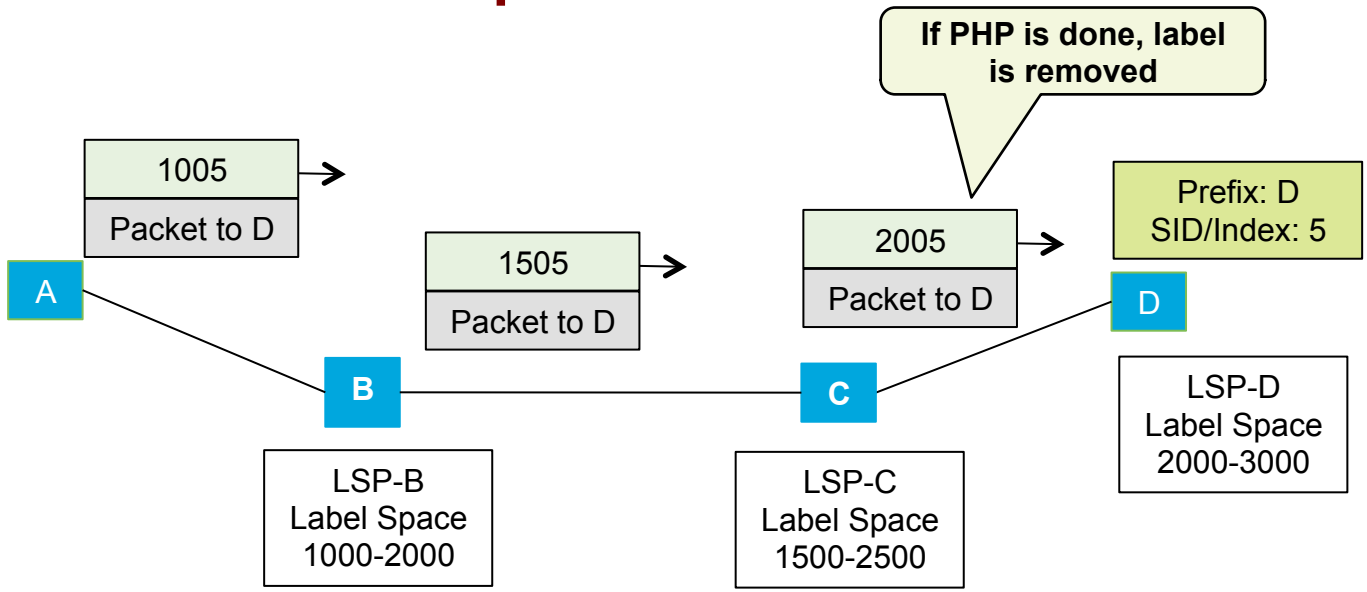

- Contains the Segment Identifier
  - Variable length: 3 or 4 octets
  - 3 octets when SR is used over MPLS dataplane (rightmost 20 bits used as a label)
- The SID/Label SubTLV is present in
  - Prefix-SID SubTLV
  - Adj-SID SubTLV
  - SID/Label Binding TLV
- SID/Label is used as an index when label space is advertised in SR-Capability SubTLV

# SID/Index and Label Spaces




- A SID is an index to the label space
- Indexes allow to mix different label spaces in a common SR domain
  - So to cope with MPLS paradigm that specifies the local scope of labels

# SID and Label Spaces

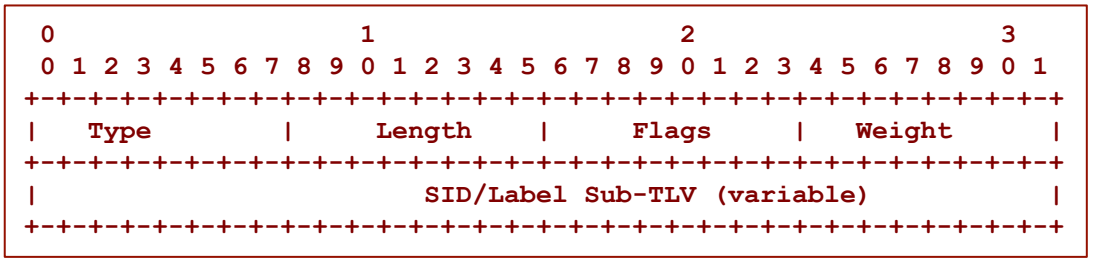



- When populating the FIB each node determines the outgoing label value based on advertised label space and SID/indexes

# Prefix-SID SubTLV

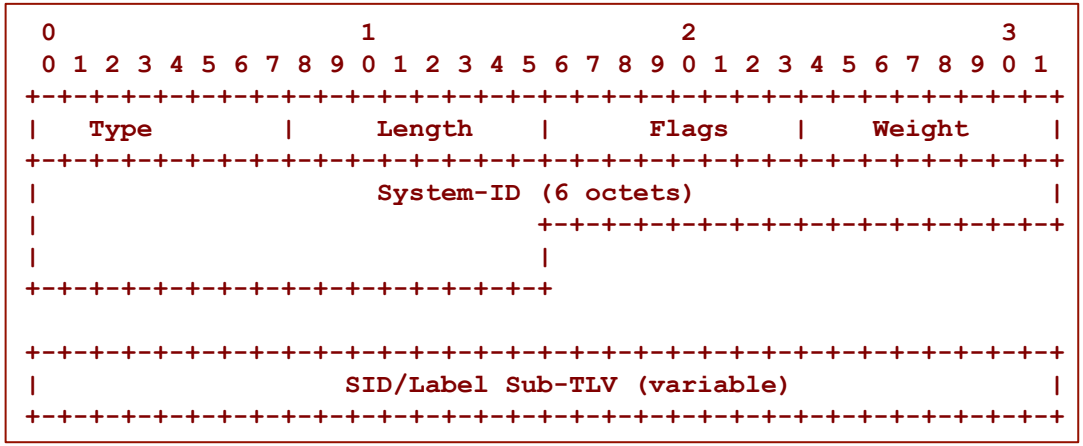

- Carries the SID of a prefix
  - Global value
- Optional SubTLV of TLVs: 135, 235, 236, 237
- Flags
  - R-Flag: re-advertisement. Set when prefix comes from either redistribution, propagation or leaking
  - N-Flag: Node-SID Flag. Set when the SID refers to a prefix identifying the node
  - P-Flag: No-PHP flag. If set, the penultimate hop will NOT pop the top label from the stack
- Algorithm
  - Identifies the algorithm associated with this prefix. Only one is defined: SPF (0)
- SID/Index
  - SID/Label SubTLV

# Adj-SID SubTLV



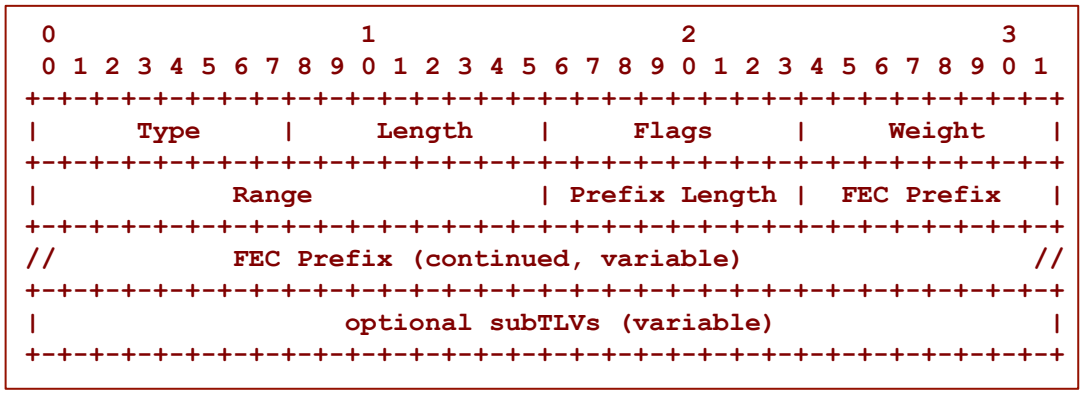

- Carries the SID of an adjacency
  - Local value
- Optional SubTLV of TLVs: 22, 222, 23, 141
- Flags
  - F-Flag: Address Family flag. When set it refers to an adjacency with IPv6 encap. When unset it refers to an adjacency with IPv4 encap.
  - B-Flag. Backup Flag. When set it refers to an adjacency being protected (FRR or MPLS-FRR)
- Weight: 1 octet for the purpose of lead balancing
- SID/Index
  - SID/Label SubTLV

# LAN-Adj-SID SubTLV



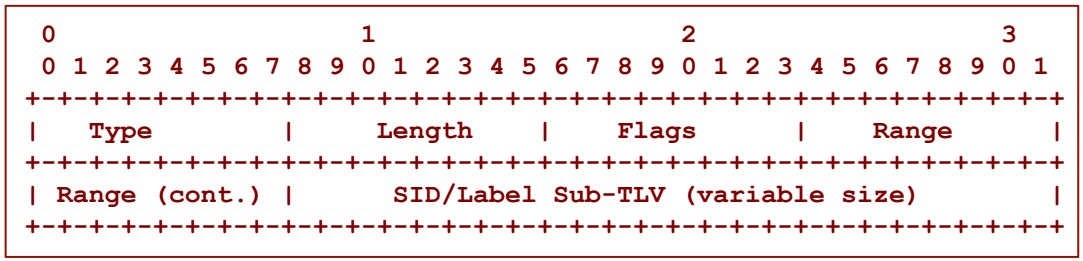

- On LAN, each router advertises a single adjacency (to the DIS)
- If SR is used over the LAN each router may need to advertise a SID for each of its neighbors
- If required, the router will use the LAN-Adj-SID Sub TLV in TLV 22/23/222/223
- Each Sub-TLV describes the neighbor System-ID and SID

# SID/Label Binding TLV



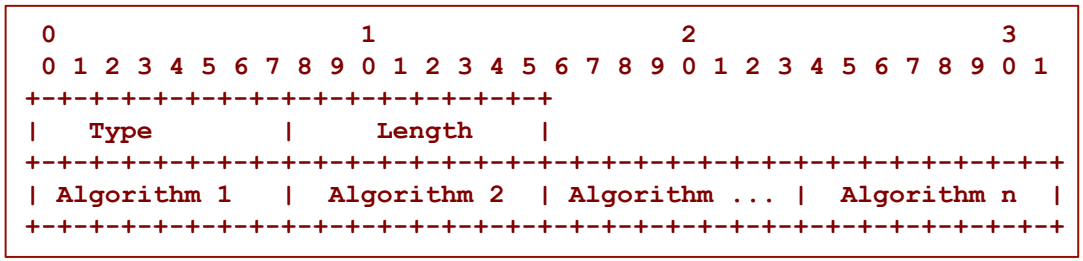

- New top level TLV describing a SID/Label binding for different purposes:
  - non local prefixes: SR Mapping Server functionality
  - TE-LSPs, Forwarding Adjacencies
- Mapping Server
  - an SR-ISIS capable node may advertise bindings <prefix, SID/Label> on behalf of non SR-capable nodes
  - encoding of such mappings are optimized through “ranges”
- TE-LSPs
  - an SR-ISIS capable node may advertise a TE-LSP associated with a SID/ Label and including objects describing the path
    - > v4/v6 ERO, backup v4/v6 ERO

# SR-Capabilities Sub-TLV




- Part of the Router Capability TLV-242 (RFC4971)
- Multiple occurrences allowed
- Describes SR capabilities
  - Flags
    - >I-Flag: IPv4, if set the router is capable of IPv4 on all interfaces
    - >V-Flag: IPv6, if set the router is capable of IPv6 on all interfaces
  - Range
    - > define label ranges allocated to SR from value defined in SID/Label Sub-TLV
    - > When advertised, the SID/Label SubTLV is an index referring to the range

# SR-Algorithm Sub-TLV




- Part of the Router Capability TLV-242 (RFC4971)
- Describes SR algorithms supported by the router
  - only one algorithm is specified for now: SPF (value: 0)