

BGP Link-State extensions for Segment Routing

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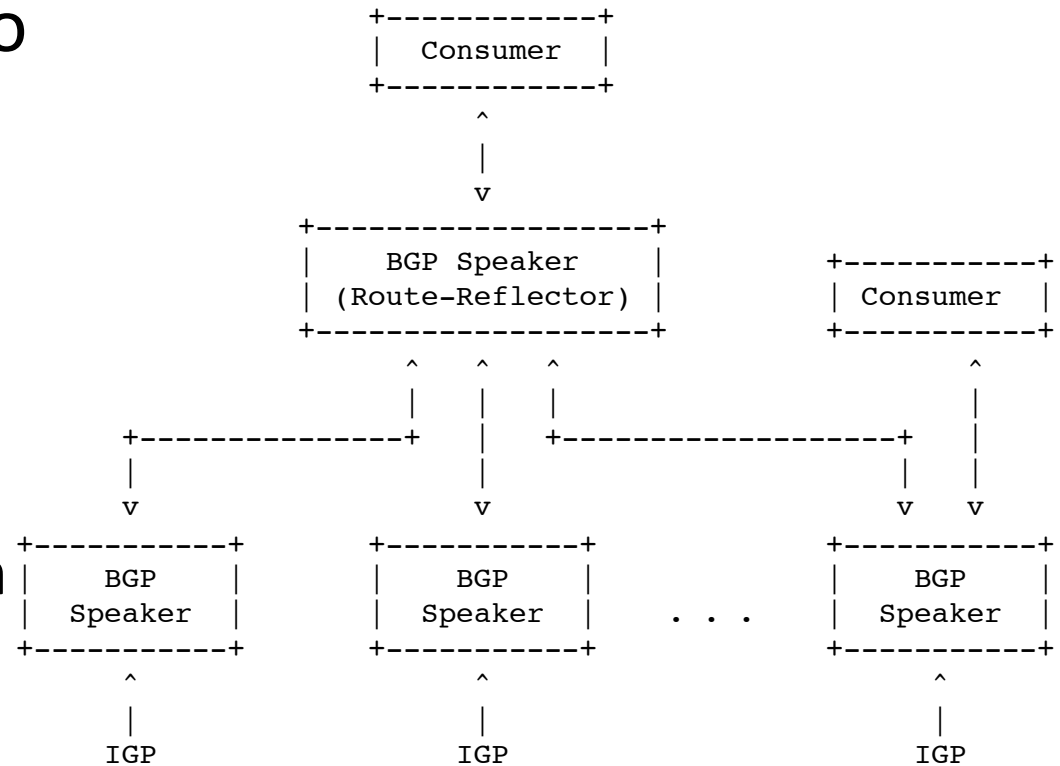
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Introduction

- Segment routing
 - A flexible, scalable way of doing source routing
- Segments are “instructions”
 - “Go to node N via shortest path”, “use link L”, etc.
 - Each segment is identified by a “Segment ID” (SID)
- IGPs advertise the <Segments, SID>
- Ingress node adds SID stack to data packets to determine the packet path
 - Per-flow state is only at the ingress node
 - SIDs map to MPLS labels for MPLS data plane

Need for BGP LS

- Segments are used to set up end-to-end paths (topological and services)
- Paths may span IGP areas, or even ASes
 - Segment information from one IGP area alone does not work



- BGP LS collects LSDB from all IGP areas
 - BGP LS provides visibility into segment information required for building end-to-end paths

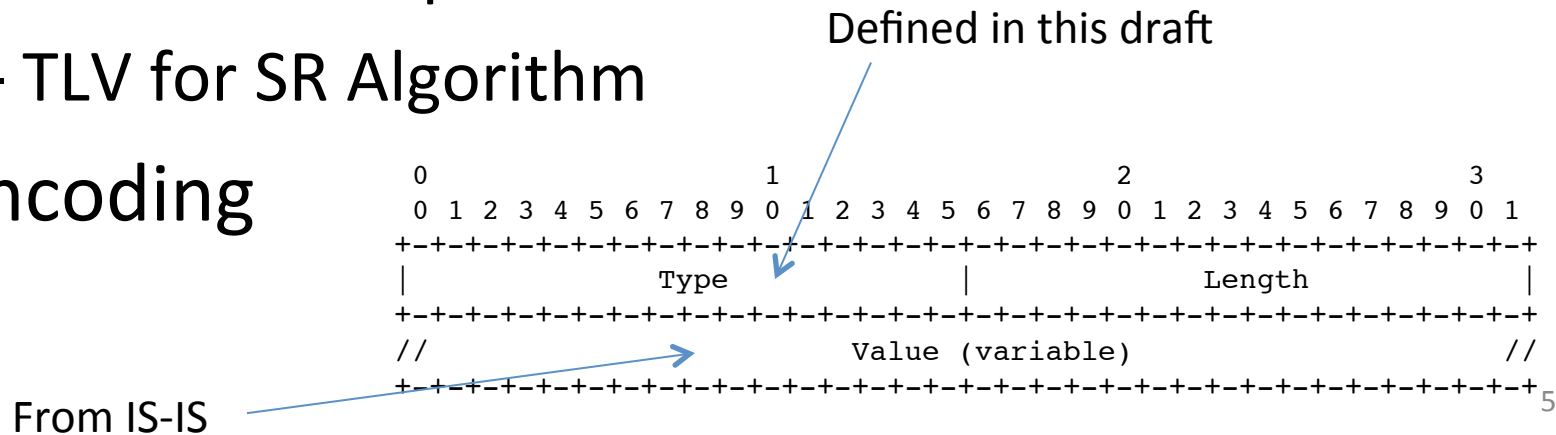
BGP LS

- BGP LS models the IGP network as a collection of three types of objects: (i) Nodes, (ii) Links (ordered pair of nodes) and (iii) Prefixes
- Each object is encoded as BGP object
 - The “key” portion of the objects is the NLRI
 - The rest of the properties of the object are in the BGP-LS attribute
 - BGP-LS attribute is a set of TLVs; easily extended
- Approach: Add the segment information in the BGP-LS attribute of the corresponding object

Segment routing TLVs

- SR information TLVs are defined in I-D.previdi-isis-segment-routing-extensions
 - TLV for Prefix-SID
 - TLV for Adjacency-SID between two nodes as well as between nodes in a LAN
 - TLV for SID/Label binding for advertising paths from other protocols (and their optional ERO)
 - TLV for SR Capabilities
 - TLV for SR Algorithm

- Encoding



SR TLVs in Node Attribute

- The following SR TLVs are in the node attribute (BGP-LS attribute that is added to a node NLRI)

TLV Code Point	Description	Length	IS-IS SR TLV/sub-TLV
1033	SID/Label Binding	variable	149
1034	SR Capabilities	variable	2
1035	SR Algorithm	variable	15

SR TLVs in Link Attribute

- The following TLVs are added to a link attribute

TLV Code Point	Description	Length	IS-IS SR TLV/sub-TLV
1099	Adjacency Segment Identifier (Adj-SID) TLV	variable	31
1100	LAN Adjacency Segment Identifier (Adj-SID) TLV	variable	32

SR TLVs in Prefix Attribute

- The following TLVs are added to a Prefix attribute

TLV Code Point	Description	Length	IS-IS SR TLV/sub-TLV
1158	Prefix SID	variable	3

What next

- WG document
- Add more details on SID/label binding TLV
- Prototype implementations