Interconnection of Segment Routing Domains
Problem Statement and Solution Landscape

draft-farrel-spring-sr-domain-interconnect-01
Adrian Farrel <afarrel@juniper.net>
John Drake <jdrake@juniper.net>

IETF-100, Singapore, November 2017
Why Did We Write This Document?

• We have a document already adopted in BESS
  – draft-ietf-bess-datacenter-gateway
    • “Gateway Auto-Discovery and Route Advertisement for Segment Routing Enabled Domain Interconnection”
  – Short document to define a new "BGP Tunnel Encapsulation Tunnel Type" for "SR Tunnel“
  – Describes how domain gateways can advertise so that:
    • Path choice is available across a multi-homed or multi-AS backbone
    • End-to-end SR paths (and SID stacks) can be computed over SR and non-SR cores
    • (despite the filename, this is not just about DC sites)
  – However, that document does not say “why” or give the full explanation of all the building blocks
• So we wrote this informational document to explain
  – The problems space
  – How many pre-existing protocol elements fit together
  – How to use the small protocol extensions in the BESS draft
Reference Model

- Two SR domains
- Want to steer end-to-end traffic
- Backbone networks might or might not be SR capable
Issues and Challenges

• Gateway selection
  – How to make all gateways to a site visible

• How to select paths (tunnels) over the backbone
  – Don’t need to see full paths
  – Do need to see options (reachability)
  – Might or might not be SR-enabled backbone

• How to identify tunnels in the backbone

• How to provide “enough” visibility to a controller
Available Building Blocks

• Learning about the network
  – BGP-LS
    • RFC 7752
    • draft-ietf-idr-bgp-ls-segment-routing-ext
  – Abstraction of topology
    • RFC 7926

• Create tunnels
  – draft-ietf-pce-pce-initiated-lsp
  – draft-ietf-pce-segment-routing

• Bind labels to prefixes
  – draft-ietf-mpls-rfc3107bis
  – draft-ietf-idr-bgp-prefix-sid

• Assign policies for placing traffic on SR paths and advertise them
  – draft-filsfils-spring-segment-routing-policy
  – draft-ietf-idr-segment-routing-te-policy

• Which tunnel type to use to reach a prefix
  – draft-ietf-idr-tunnel-encaps

• Discover gateways and propagate all gateways through all ASBRs
  – draft-ietf-bess-datacenter-gateway
Worked Example: Step 1
Abstraction, Build Tunnels, and Assign SIDs
Step 2
Select a Path and Build a SID Stack

- Selected path
  Src-N1a-GW1a-PE1a-(RSVP-TE LSP)-PE1c-GW3b-N3b-Dst
- Fully explicit label stack
  L103, L201, L202, L304, L402, L403
- Egress domain doesn’t share topology
  L103, L201, L202, L304, L403
- Source domain only has reachability info
  L103, L304, L403
Alternate Step 2
Select a Path and Build a SID Stack

- Selected path spans ASes
  Src-N1b-GW1b-PE2a-(RSVP-TE LSP)-ASBR2a-ASBR3a-(RSVP-TE LSP)-PE3b-GW3a-N3a-Dst

- Fully explicit label stack
  L102, L206, L207, L209, L210, L301, L401, L403

- Source domain only has reachability info
  L102, L301, L403
Next Steps

• Is it helpful to have this type of document?
  – Some people say “It’s just a white paper. Publish it elsewhere.”
  – Some people say “This is really helpful to understand how all of the pieces of IETF work fit together for a real deployment.”

• The authors plan to keep this draft alive as a framework for discussion
  – It seems to us (the authors) that SPRING is a good place to have those discussions