BGP-LS extension

for inter-as topology retrieval

draft-wang-idr-bgpls-inter-as-topology-ext

Aijun Wang

China Telecom

IETF101@London, Mar 2018

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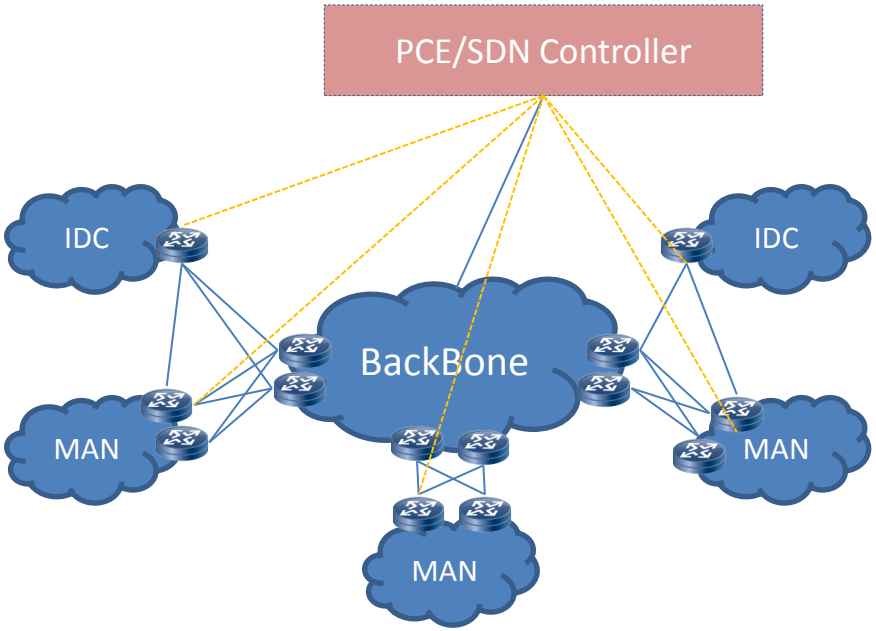
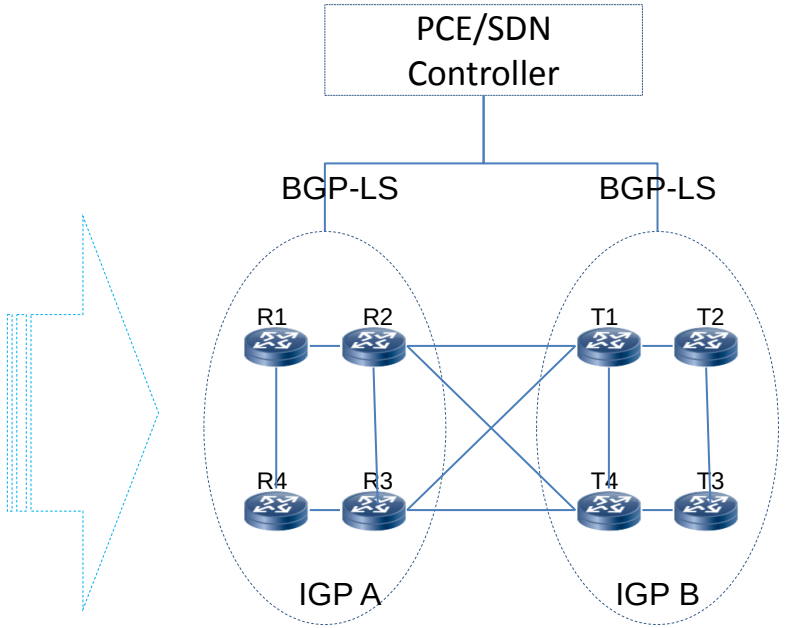
Scenario Summary





1. One backbone and hundreds of MAN/IDC, which are interconnected with each other via bundles of links. Each MAN/IDC and Backbone are in different IGP domain.
2. Need to collect the topology of each domain and build the inter-domain topology as well automatically.

1. IGP A/IGP B may run different IGP protocol, distributed traffic engineering may or may not deploy in every domain.
2. Collect the topology information from different domains via BGP-LS, and retrieve inter-as topology under different scenarios.

Solution Requirements

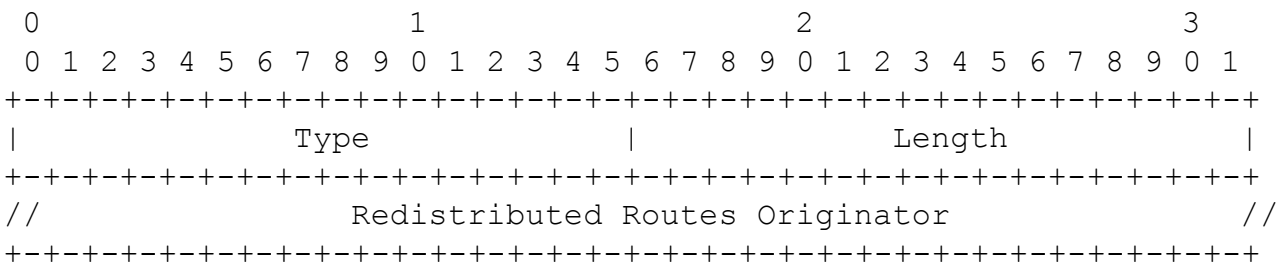
- Preserve the distributed protocol as unchanged as possible
- Enhance the north-south protocol under SDN era.
- Keep the deployment as simple as possible.
- Solution should suitable for various scenarios.

Current Solutions

RFC/Draft	Key Points	Limitation
RFC7752(BGP-LS)	IGP topology within one domain	No inter-as topology information
SR-EPE	ASBR reports the inter-as links and nodes	Every ASBR must run BGP-LS protocol
SR-EXT	Introduce “Source Router Identifier” TLV to transfer	Mainly for IS-IS
RFC5316(IS-IS TE extension for inter-AS)	IS-IS TLV extension to transfer the information about inter-AS TE links and nodes	Deployment TE within each domain/Not included in BGP-LS
RFC 5392(OSPF TE extension for inter-AS)	OSPF TLV extension to transfer the information about inter-AS TE links and nodes	Deployment TE within each domain/Not included in BGP-LS
PCE in Native IP	Describe scenarios for PCE in Native IP	No solution for inter-as topology retrieval

Proposed BGP-LS extension(1)

Redistributed Routes Originator(RRO) TLV



Type: should be allocated by IANA.
Length: 4 or 16 Bytes.
Redistributed Routes Originator: Router ID of the redistributed routes.

IGP Protocol	Value of "Redistributed Routes Originator"	Ref.
IS-IS	IPv4/IPv6 Address of redistributed router	RFC7794
OSPFv2	Advertising Router of "LSA Type 5"	RFC2328 section 12.1.5 "Advertising Router"
OSPFv3	Advertising Router of "E-AS-External-LSA"	draft-ietf-ospf-ospfv3-lsa-extend-23#section-4.5

Non-TE scenario

Proposed BGP-LS extension(2)

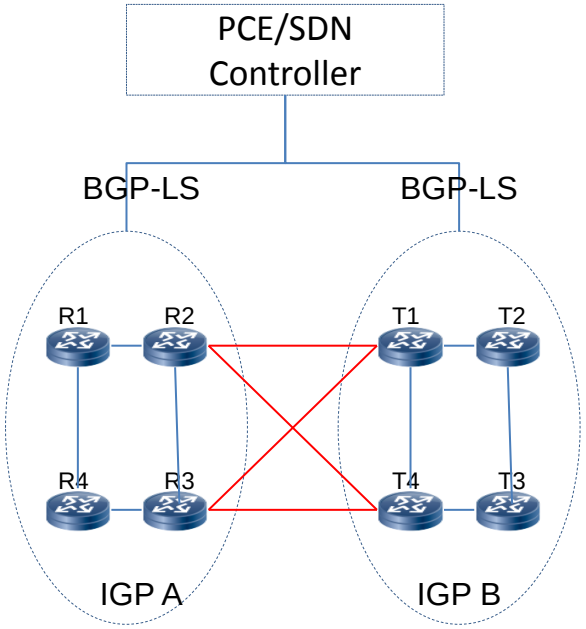
Inter-AS TE related TLVs

TLV Code Point	Description	IS-IS/OSPF TLV/Sub-TLV	Reference (RFC/Section)
TBD	Remote-AS Number	24/21	[RFC5316]/3.3.1 [RFC5392]/3.3.1
TBD	IPv4 Remote ASBR ID	25/22	[RFC5316]/3.3.2 [RFC5392]/3.3.2
TBD	IPv6 Remote ASBR ID	26/24	[RFC5316]/3.3.3 [RFC5392]/3.3.3

TE scenario

Topology Reconstruction

- TE Scenario
  - Topology reconstruction is straightforward. Because PCE/SDN controller knows the AS, ASBR IPv4/IPv6 router-ID, associated TE links that are already included in BGP-LS TLV, and remote AS, remote ASBR IPv4/IPv6 router-ID that newly proposed in current draft.
- Non-TE Scenario
  - Reconstruction Process is shown below:



Non-TE Scenario

PCE collects BGP-LS topology respectively in different domain
(inter-AS links are normally not included)

↓

Redistribute inter-as links on every ASBR router in each domain

↓

Redistribute routes will be included in NLRI type 3 or NLRI type 4 of BGP Link-State NLRI
(no information about the originator of these prefixes)

↓

With newly defined BGP-LS TLV in current draft
PCE can anchor these prefixes to corresponding ASBR

↓

PCE reconstruct the inter-as topology when comparing these prefixes and their anchors

Solution Benefit

- General Solution for inter-AS topology retrieval
- No dependencies on the protocol source of these prefixes as anticipated by the BGP-LS protocol.
- PCE can retrieve the inter-AS topology automatically according to the procedures described in this presentation and the additional information reported by the newly defined TLVs.

Further Action

- Comments?
- Adopt as WG-draft?

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IETF101@London