PCE in Native IP Network

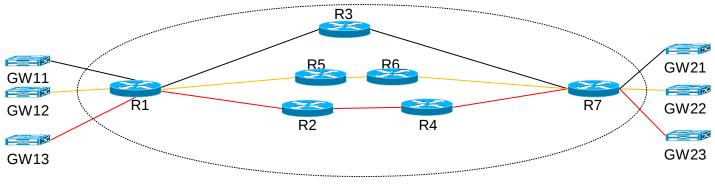**https://datatracker.ietf.org/doc/draft-wang-teas-pce-native-ip/**

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Background

- When we talk about traffic engineering and central path computation(PCE), it is always coupled with complex mpls signaling.

- With the advent of SDN concepts, is it possible to use the PCE in the native IP network, to compute one E2E QoS assured path centrally and dynamically?

- If possible, how?

Aimed Scenario

- Routers in AS X supports only native IP protocol.
- Traffic within AS X is changing dynamically.
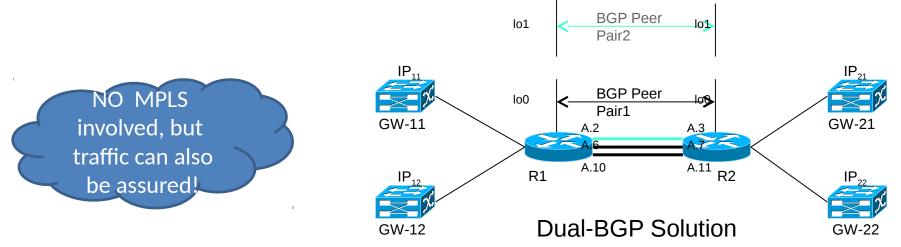- Application(traffic between GW11 and GW21) require E2E QoS assurance
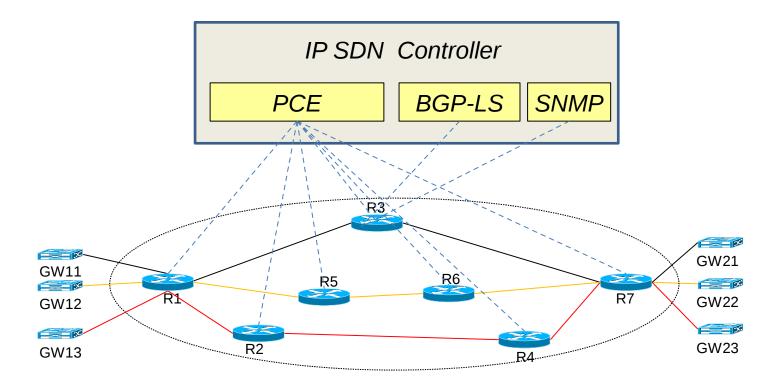
Solution Philosophy

Consider the simplest scenario first, need only the following steps:

1. Build two different BGP peers between each router pair, using different loopback address.

2. Routes for normal traffic is advertised via BGP peer 1, and routes for assured traffic is advertised via BGP peer 2.

3. Set the next-hop for different loopback address to different physical link address.

Normal/Assured Traffic will be separated on different physical links.

lo1 — BGP Peer Pair2 — lo1

NO MPLS involved, but traffic can also be assured!

IP$_{11}$
GW-11

IP$_{12}$
GW-12

lo0 — BGP Peer Pair1 — lo0

A.2   A.3
A.6   A.7
A.10   A.11
R1   R2

IP$_{21}$
GW-21

IP$_{22}$
GW-22

Dual-BGP Solution

PCE in Native IP network

BGP-LS: Get the underlying topology dynamically.
SNMP: Get the link utilization information dynamically.
PCE: Calculate the right E2E path for assured traffic
PCEP: Transfer the key information for Dual/Multi-BGP session
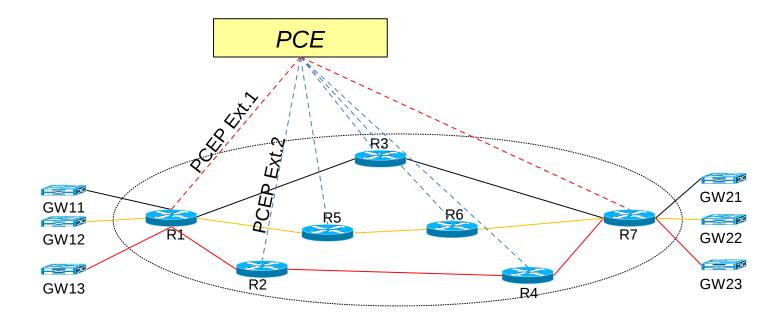
Why use Dual/Multi-BGP sessions?

- Use Dual/Multi BGP sessions to carry the prefixes that requires different QoS treatments.
- The assured traffic and their paths can be controlled separately:
  - If the application that needs to be protected changed, we need change only the prefixes advertised by BGP.
  - If the traffic of the protected application changed, we need only change the path to the BGP next-hop hop-by-hop.
  - Intermediate routers keep only the routes to edge router's loopback address, not the route to the prefix of every application(as that does in BGP flowspec, MPLS TE, OF etc.).
- In large network, router need only peer with RR.

Why use PCE?

- Can compute the path in central mode.
- Can control the routers in-path on demand.
- PCEP are supported by most router vendors and can easily be extended.

Next Steps

- Extend the PCEP to transfer the following key information:
  - Prefixes that needs to be treated differently.(Ext.1)
  - Routes to loopback address of edge router. (Ext.2)

Comments?

Thank you!

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