SRv6 Deployment Consideration

draft-tian-spring-srv6-deployment-consideration-03

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Introduction

- draft-matsushima-spring-srv6-deployment-status
  - Introduce the progress of SRv6 industry including deployments, implementations, academic contributions, interoperability, etc.
  - 8+ deployments are proposed: Softbank, China Telecom, LINE Corporation, China Unicom, CERNET2, MTN Uganda Ltd.

- draft-tian-spring-srv6-deployment-consideration
  - Introduce the deployment consideration of SRv6 deployment including thinking on SRv6 advantages, incremental deployment guidance, deployment cases , etc.
  - Introduce relatively detailed experience of SRv6 deployments for reference while draft-matsushima-spring-srv6-deployment-status introduces the feature list of SRv6 deployments.

SRv6 Advantages

- IP Route Aggregation
  - MPLS/SR-MPLS: Label binding with 32-bit host address has to be advertised across multiple domains without aggregation.
  - SRv6: Inherit native IP feature and aggregated routed can be imported across network domains which reduces the scalability requirement.
- End-to-end Service Auto-start
  - SR-MPLS: SRGB and Node SID need overall network-wide planning in the cross-domain scenario.
  - SRv6: Can Setup E2E tunnel directly based on IPv6 reachability.
- On-Demand Upgrade
  - SR-MPLS: Entire network has to be upgraded firstly and then deploy SR-MPLS; or mapping servers are deployed at some of the intermediate nodes.
  - SRv6: The network can be migrated to SRv6 on demand. For the nodes which cannot support SRv6, it can be transferred through normal IPv6 forwarding.
- In summary
  - MPLS/SR-MPLS: IP reachability is the base. MPLS label advertisement has to be done in the whole network.
  - SRv6: IPv6 reachability is the base. SRv6 can be deployed incrementally.
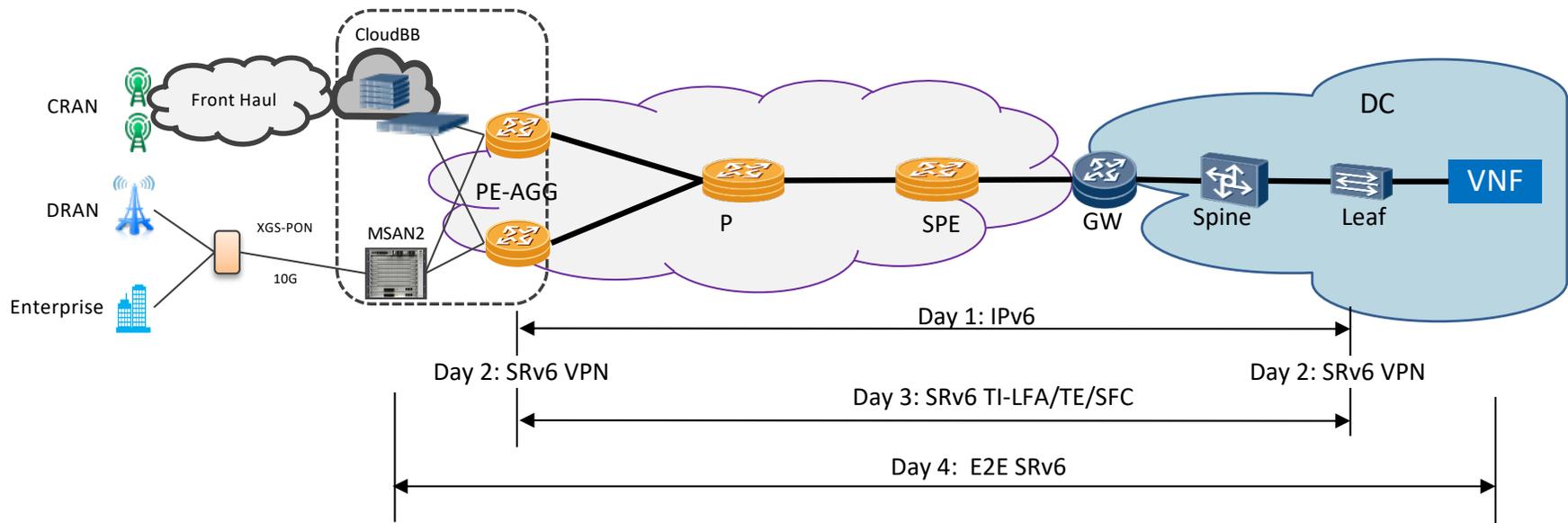
MPLS
IP

vs.

Locator	Function

# Incremental Deployment Guidance for SRv6 Migration

- Two options can be parallel:
  - Option 1: IP/MPLS -> IPv6->SRv6
    - **Nature and straightforward, recommend;**
  - Option 2: IP/MPLS -> SR-MPLS -> SRv6

Step 1: Upgrade to IPv6 (IPv6 ready is the pre-condition of SRv6);
Step 2: Upgrade the edge devices to introduce VPN over SRv6 BE;
Step 3: Upgrade some intermediate nodes to support traffic TI-LFA, TE, SFC, etc.
Step 4: Upgrade the whole network to support E2E SRv6;

SRv6 Deployment Case 1: China Telecom

- China Telecom: video monitoring traffic transmission between DCs
- IPv6 ready in both DC and backbone, two backbone networks provide different SLAs
- Two steps: 1) Introduce L3VPN over SRv6 BE at the edge; 2) Support traffic steering/optimization by introduce SRv6 TE
- *Key take-away: easy and quick*
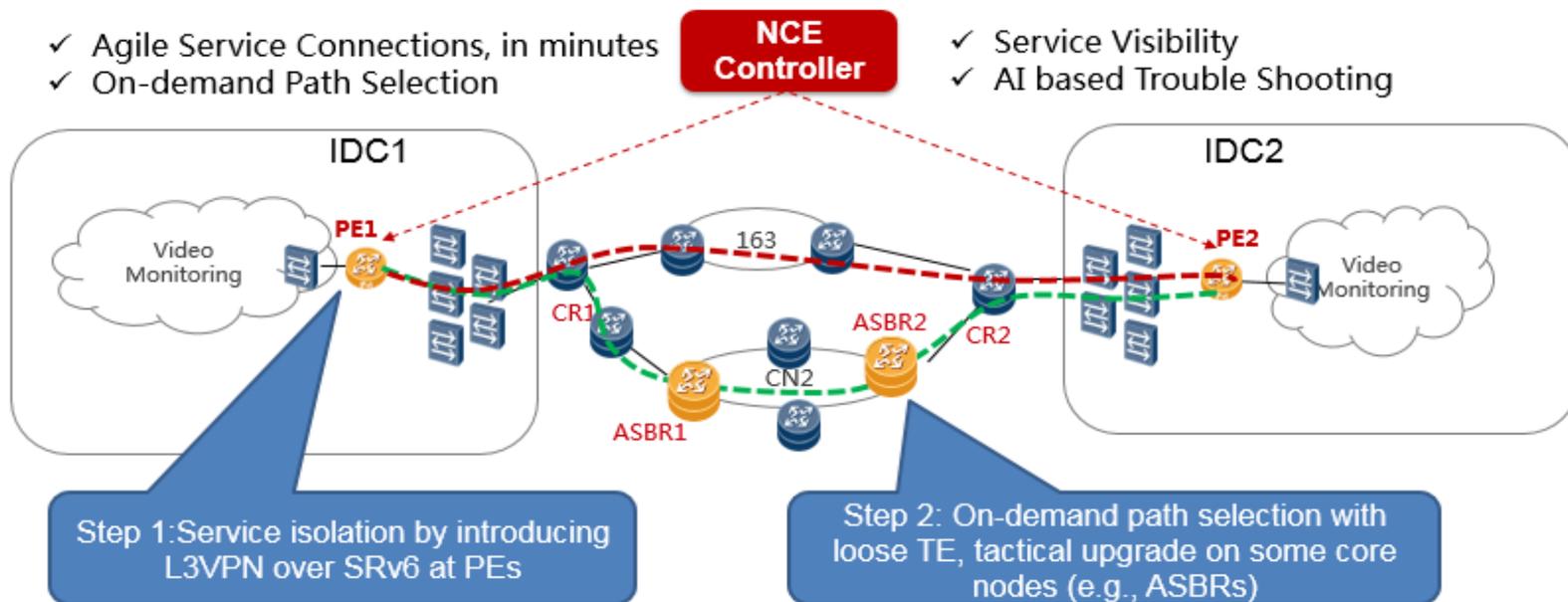
SRv6 Deployment Case 2: China Unicom

- China Unicom: Cloud DCs interconnection.
- IPv6 ready in Metro networks (Guangzhou, Beijing,…) and IP backbone network (169);
- Upgrade PEs at Metro edges to support SRv6, introduce L3VPN over SRv6 BE for cloud isolation;
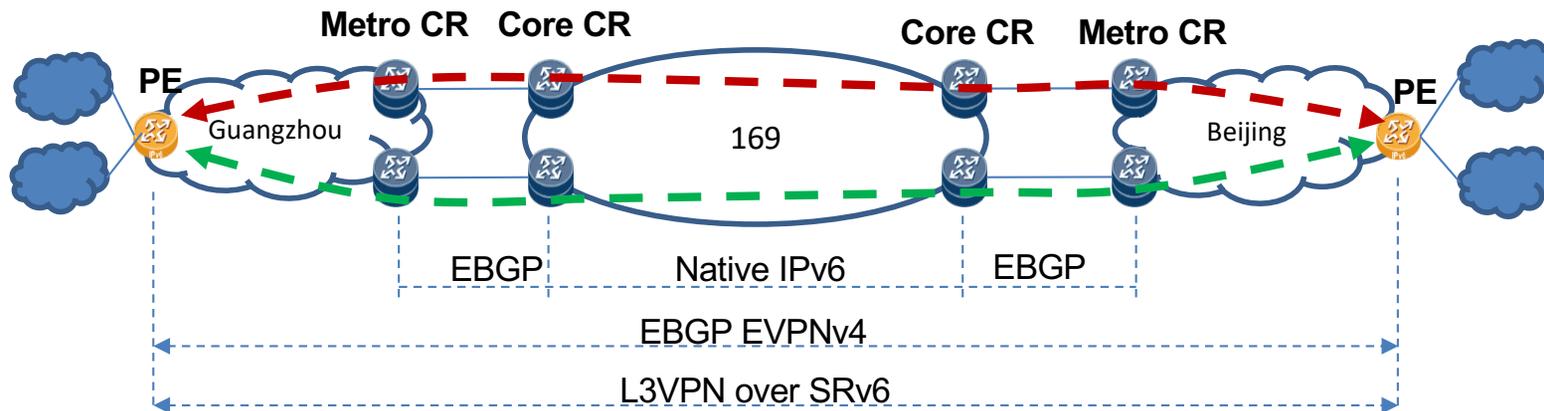
- ✓ Smoothly migrate from IPv6 to SRv6, easy and quick;
- ✓ Without affecting existing IPv4, MPLS, etc. services

SRv6 Deployment Case 3: Uganda MTN: SRv6 Policy

AS IS：Multiple Configs, Complicated Protection, High Ratio of Complaints
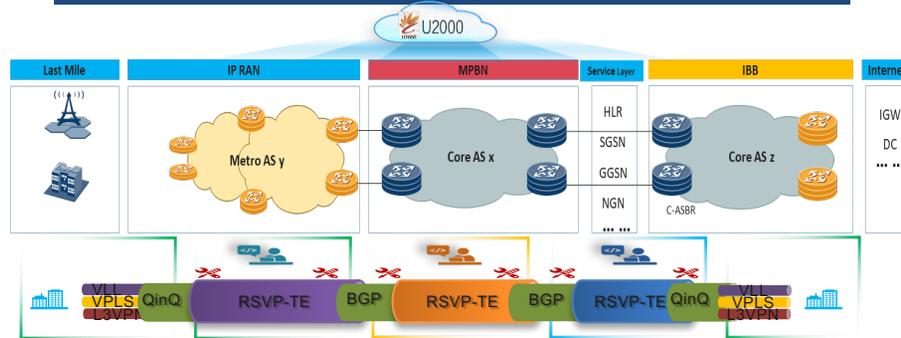
| Device	Device Amount	RSVP-TE Instances (per-Device)	RSVP-TE Config Lines (per-Device)	BFD Instances (per-Device)	BFD Config Lines (per-Device)	Total Config Lines
RSG	14	151	10	260	5	22960
ASG	189	42	10	60	5	136080

Customer Pain Points :

1、Total fiber length: 5500KM, 30~119 fiber cut times per month in 2019. [1]

2、Thousands of complaints per month caused by fiber cut. [2]

3、Complicated configs for service protection, totally about 160K lines for 203 ASGs & RSGs.

4、Pre-allocated & immutable backup path

[1] Uganda MTN CEO KPI report
[2] Uganda MTN Troubleshooting System Design

TO BE：Simplify deployment by SRv6+Ti-LFA , Reduce ratio of complaints

TE/BFD Config Lines
159040

➡

TI-LFA Config Lines
203
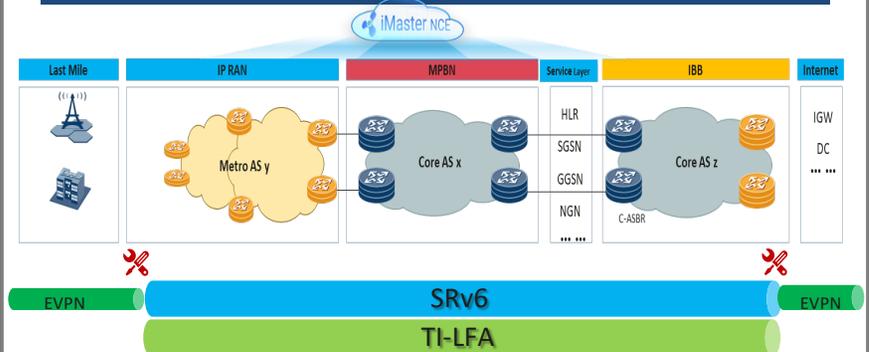
Customer Values :

1、TI-LFA covers any topologies (100%), only needs IGP view global enabled, much simplified compared to the legacy protection technologies.

2、SRv6 has super simplified configs, loose routing algorithm based on SRv6 Policy can support legacy network to quickly migrate to SRv6, protect customers' investments.

3、Build-in reliability mechanism in packet header realizes local auto-protection and anti micro-loop, effectively improve network reliability, reduce ratio of complaints.

SRv6 Commercial Deployments in China 2019

Commercial Cases	Scenarios	Key Features
China Telecom (Sichuan)	2B: Cloud Leased Line and VPN 2C: Home , vCDN 5G Carrier	SRv6 VPN/BE, SRv6 TE/Policy, TI-LFA
China Telecom (Jiangsu)	Video Private Network	SRv6 VPN/BE
China Telecom -163 backbone	Cloud-based Flow Reinjection Tianyi Public Cloud	SRv6 TE/Policy
China Telecom (Shanghai)	Teleco Cloud - Reconstruction of CO site	SRv6 VPN/BE
China Unicom (Guangdong)	Cloud Leased Line	SRv6 VPN/BE
China Unicom (Beijing)	Cloud VR	SRv6 VPN/BE
China Unicom (Xiong'an)	5G Mobile Transport	SRv6 VPN/BE
China Mobile (Guangdong)	VPN	SRv6 VPN/BE
CERNET2 - Tsinghua University	IPv6 Backbone – Education	SRv6 VPN/BE , SRv6 TE/Policy
Bank of China	IPv6 Backbone – Financial Industry	SRv6 VPN/BE

Next Step

- More deployment cases for different application scenarios such as 5G Transport, Data Center, etc.

- More experience are provided on demand such as IPv6 address/SRv6 locator/ SRv6 SID design, SRv6 TE/SRv6 policy design, etc.

- Welcome feedback and co-work.

Thanks