SRv6 Network Programming

draft-filsfils-srv6-network-programming-05

IETF102; Montreal July 2018

Clarence Filsfils
Pablo Camarillo
John Leddy
Daniel Voyer
Satoru Matsushima
Zhenbin Li

Daniel Bernier

Introduction

- "SRv6 network programming" refers to the capability for an application to encode any network program as a set of individual functions distributed through the SRv6 network

- This main document describes the SRv6 network programming concepts, its various functions, and its main use-cases

SRv6 behaviors

```
End             Endpoint function
                The SRv6 instantiation of a prefix SID
End.X           Endpoint function with Layer-3 cross-connect
                The SRv6 instantiation of a Adj SID
End.T           Endpoint function with specific IPv6 table lookup
End.DX2         Endpoint with decapsulation and Layer-2 cross-connect
                L2VPN use-case
End.DX2V        Endpoint with decapsulation and VLAN L2 table lookup
                EVPN Flexible cross-connect use-cases
End.DT2U        Endpoint with decaps and unicast MAC L2 table lookup
                EVPN Bridging unicast use-cases
End.DT2M        Endpoint with decapsulation and L2 table flooding
                EVPN Bridging BUM use-cases with ESI filtering
End.DX6         Endpoint with decapsulation and IPv6 cross-connect
                IPv6 L3VPN use (equivalent of a per-CE VPN label)
End.DX4         Endpoint with decapsulation and IPv4 cross-connect
                IPv4 L3VPN use (equivalent of a per-CE VPN label)
End.DT6         Endpoint with decapsulation and IPv6 table lookup
                IPv6 L3VPN use (equivalent of a per-VRF VPN label)
End.DT4         Endpoint with decapsulation and IPv4 table lookup
                IPv4 L3VPN use (equivalent of a per-VRF VPN label)
End.DT46        Endpoint with decapsulation and IP table lookup
                IP L3VPN use (equivalent of a per-VRF VPN label)
End.B6          Endpoint bound to an SRv6 policy
                SRv6 instantiation of a Binding SID
End.B6.Encaps   Endpoint bound to an SRv6 encapsulation Policy
                SRv6 instantiation of a Binding SID
End.BM          Endpoint bound to an SR-MPLS Policy
                SRv6/SR-MPLS instantiation of a Binding SID
End.S           Endpoint in search of a target in table T
```

```
T               Transit behavior
T.Insert        Transit behavior with insertion of an SRv6 policy
T.Insert.Red    Transit behavior with reduced insert of an SRv6 policy
T.Encaps        Transit behavior with encapsulation in an SRv6 policy
T.Encaps.Red    Transit behavior with reduced encaps in an SRv6 policy
T.Encaps.L2     T.Encaps behavior of the received L2 frame
T.Encaps.L2.Red Transit with reduce encaps of received L2 frame
```

+ Intra-domain basic security ACLs
+ Counters

Use Cases (I-D illustrations)

- Basic Security

- SR-L3VPN

- SR-L2VPN-VPWS

- SRTE for Underlay SLAs
    - Policy @ ingress PE
    - Policy @ mid

- End-to-end SRTE policy

- TI-LFA

- SRTE for Service Programming

I-D history

- Rev00 published in March 2017
  - Main draft. Including functions, illustrations, … -> **Presented in IETF98 (Chicago, March 2017)**
- Rev01 published in June 2017
  - Minor update. Draft clarifications. Formal definition of counters
- Rev02 published in October 2017
  - New EVPN functions End.DX2V, End.DT2U, End.DT2M and related illustrations
  - New function End.DT46
  - **Moved End.AS, End.AM to draft-xuclad-spring-sr-service-chaining-01**
- Rev03 published in December 2017
  - Added OAM (O-bit processing, End.OTP function) with related illustrations
- Rev04 published in March 2018
  - Added support for reduced SRH (T.Insert.Red; T.Encaps.Red; T.Encaps.L2.Red; End.B6.Encaps.Red)
  - IANA registry for SRv6 Endpoint types
- Rev05 published in July 2018
  - Added End.B6.Red (editorial error from previous revision)
  - **OAM content (O-bit processing and End.OTP) moved to draft-ali-spring-srv6-oam**

Technology state

- Large community support (both from vendors and operators)

- Multiple interoperable implementations (both open-source and proprietary)
    - SIGCOMM 2017 Interop
    - EANTC Interop 2018
    - **draft-filsfils-spring-srv6-interop**
        - Linux kernel: End, End.X, End.T, End.DX2, End.DX6, End.DX4, End.DT6, End.B6, End.B6.Encaps, T.Insert, T.Encaps, T.Encaps.L2
        - Linux srext module: End, End.X, End.DX2, End.DX6, End.DX4, End.AD, End.AM
        - FD.io VPP: End, End.X, End.DX2, End.DX6, End.DX4, End.DT6, End.DT4, End.B6, End.B6.Encaps, End.AS, End.AD, End.AM, T.Insert, T.Encaps, T.Encaps.L2

Related work based on this I-D

- draft-dukes-spring-sr-for-sdwan-01
- draft-ietf-dmm-srv6-mobile-uplane-02*
- draft-xuclad-spring-sr-service-programming*

- draft-dawra-idr-srv6-vpn-04
- draft-ali-spring-srv6-oam-01*
- draft-raza-spring-srv6-yang-01
- draft-rodrigueznatal-lisp-srv6-00
- draft-dawra-idr-bgpls-srv6-ext-03
- draft-bashandy-isis-srv6-extensions-03
- draft-li-ospf-ospfv3-srv6-extensions-01

Next steps

- Seeking WG input and feedback (any comment is welcomed!)