Segment Routing Header
draft-ietf-6man-segment-routing-header-17

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Agenda

- Running Code and Deployments
- Changes 16/17
- Issues to close
- Close last call
SRv6 Collaboration Adoption

- 6 years since first presentation to the IETF
- 5 years since the first implementation
- Industry support, operators, vendors, academic research
- Twenty-four revisions
- 1000+ emails on 6man (~1 email per line of text).
- 16+ IETF presentations delivered.
Open Source Delivered.

- Linux 4.10 Feb 2017
- Linux srext April 2017
  - https://github.com/netgroup/SRv6-net-prog
- FD.io VPP 17.04: April
Cisco Shipping Product Now

- First support April 2017
- Cisco ASR 9000 – Shipping now
- Cisco NCS 5500 – Shipping now
- Cisco NCS 540 – Shipping now
- Cisco ASR 1000 – engineering code
Huawei Shipping Product Now

- ATN with VRPV8 – Shipping now
- CX600 with VRPV8 – Shipping now
- NE40E with VRPV8 – Shipping now
- ME60 with VRPV8 – Shipping now
- NE5000E with VRPV8 – Shipping now
- NE9000 with VRPV8 – Shipping now
- NG-OLT MA5800 with VRPV8 – Shipping now
NPUs and Test Gear

- Barefoot – Tofino NPU Shipping Now (since May 2017)
- Spirent - Hardware implementation in Spirent TestCenter.
- Ixia - Hardware implementation in Ixia IxNetwork.
Applications

- Wireshark
- tcpdump
- iptables
- nftables
- Snort
Research

- Leveraging eBPF for programmable network functions with IPv6 Segment Routing (https://doi.org/10.1145/3281411.3281426)
  * http://netgroup.uniroma2.it/Stefano_Salsano/papers/18-sr-snort-demo.pdf
- Interface Counters in Segment Routing v6: a powerful instrument for Traffic Matrix Assessment (https://doi.org/10.1109/NOF.2018.8597768)
- Exploring various use cases for IPv6 Segment Routing (https://doi.org/10.1145/3234200.3234213)
- SRv6Pipes: enabling in-network bytestream functions (http://hdl.handle.net/2078.1/197480)
- Software Resolved Networks (https://doi.org/10.1145/3185467.3185471)
- 6LB: Scalable and Application-Aware Load Balancing with Segment Routing (https://doi.org/10.1109/TNET.2018.2799242)
- Implementation of virtual network function chaining through segment routing in a linux-based NFV infrastructure - IEEE Conference Publication (https://doi.org/10.1109/NETSOFT.2017.8004208)
- A Linux kernel implementation of Segment Routing with IPv6 - IEEE Conference Publication (https://doi.org/10.1109/INFCOMW.2016.7562234)
- Leveraging IPv6 Segment Routing for Service Function Chaining (http://hdl.handle.net/2078.1/168097)
L3VPN with TE and Service Programming

- T.Encap, END, END.DX6, END.X
- Linux srext kernel module created by University of Rome, Tor Vergata, Italy.
- FD.io Vector Packet Processor (VPP) virtual router.
- Barefoot Networks Tofino NPU using the P4 programming language.
- Cisco NCS 5500 router using commercially available NPU.
- Cisco ASR 1000 router using custom ASIC.
- L3VPN with Traffic Engineering and Service Programming
EANTC 2018

L3 VPN with TE and TILFA

- T. Encaps, END, END.X, END.DT4
- Cisco NCS 5500 - commercially available NPU
- UTStarcom UAR500 – Hardware Implementation
- Ixia IxNetwork – Hardware Implementation
- Spirent TestCenter – Hardware Implementation
Cisco and Softbank
5G Nation-wide SRv6

- Segment Routing Header
  - draft-ietf-6man-segment-routing-header

- END (PSP), EN.D.X (PSP), END.DT4, T.Encaps.Red and T.Insert.Red functions
  - draft-filsfils-spring-srv6-network-programming

- ISIS SRv6 extensions
  - draft-bashandy-isis-srv6-extensions

- BGP VPN SRv6 extensions
  - draft-dawra-bess-srv6-services

- SRv6 Topology Independent (TI-LFA) Fast Reroute
  - draft-ietf-rtgwg-segment-routing-ti-lfa

- BGP Prefix Independent Convergence (PIC) core and edge
  - draft-ietf-rtgwg-bgp-pic

- Ping and Traceroute
  - draft-ali-6man-spring-srv6-oam
Huawei and China Telecom SRv6 Video Network

- A Segment Routing Header
  - draft-ietf-6man-segment-routing-header

- END.DT4 function
  - draft-filsfils-spring-srv6-network-programming

- BGP SRv6 extensions
  - draft-dawra-bess-srv6-services

- BGP Prefix Independent Convergence (PIC) core and edge
  - draft-ietf-rtgwg-bgp-pic

- Ping and Traceroute
  - draft-ali-6man-spring-srv6-oam
Changes 16/17
Deployment Model

- Intra SR Domain deployment model
  - securing the SR Domain from external attempt to use its SIDs
  - SR Domain as a single system with delegation between components
  - handling packets of the SR Domain
Other Changes

- Network Programming
  - Remove reference

- TLV processing limits
  - When length of TLVs exceeding hdr ext len

- Pad TLV
  - Minor description updates

- HMAC
  - Cover destination address matching first segment

- Extension header processing order
  - Process in the order received

- Flow label/ECMP
  - Set for intra-domain and inter-domain packets
IANA

- Issue 64
  - Added IANA Designated Expert instructions for Flags and TLV
  - Require a WG draft
  - Require notification to 6man
  - Based on recommended text from RFC8126
Issues to Close

https://trac.ietf.org/trac/6man/report/9
Tag

- Processing is defined in the draft
- Usage is not
- Example uses:
  - OpenStack "Group Based Policy"
    https://wiki.openstack.org/wiki/GroupBasedPolicy
  - OpenDaylight, "Group Policy"
    https://wiki.opendaylight.org/view/Group_Policy:Main
TLV

- Fundamental to SR architecture: integrated underlay, overlay and service chaining solution.
- SR Source nodes combine segments for TE or service functions.
- A TLV within the SRH ensures lower processing overhead for topological segments.
- No need to parse TLVs at every segment.
Management Section

- Not planned
- Leave this work to other documents

- Management
  - Data Model
    - SID
    - SRH Encap
  - HMAC
The Plan to Close Last Call

- **Objective:**
  - Close open issue this week

- **Meetings**
  - Tuesday/Wednesday meet submitters, document resolution

- **Report to the list:**
  - Update on each open issue, include proposed text if any

- **Update the draft:**
  - Minor updates this week

- **Report:**
  - Friday report and discuss.
Discussion