IETF Hackathon - IPFIX On-Path Telemetry with SRv6

IETF 118 4–5 November 2023 Prague, Czech Republic



Hackathon Plan

- Collect hop-by-hop delay of from SRv6 nodes using following I-D/RFCs:
 - o **IPFIX IEs of SRv6 SRH** (<u>draft-ietf-opsawg-ipfix-srv6-srh</u>): Implemented in IETF 117 hackathon
 - IPFIX IEs of On-Path Delay (<u>draft-opsawg-ipfix-on-path-telemetry</u>)
 - IOAM Edge-to-Edge Option-Type (<u>RFC 9197</u>)
- Goal: delay collection with IPFIX in SRv6 network with Linux Router
 - Implement IEs to <u>Fluvia Exporter</u>, an IPFIX exporter with eBPF/XDP
 - Implement additional <u>Wireshark</u> dissectors

What got done

Fluvia Exporter:

- COMPLETED: Decode the IOAM Edge-to-Edge Option-Type timestamp with eBPF/XDP
 - RFC 9197
- COMPLETED: Export the on-path delay & SRv6 SRH information with IPFIX
 - draft-ietf-opsawg-ipfix-on-path-telemetry-04
 - Interoperability test was succeeded with nfacct and following Wireshark dissector

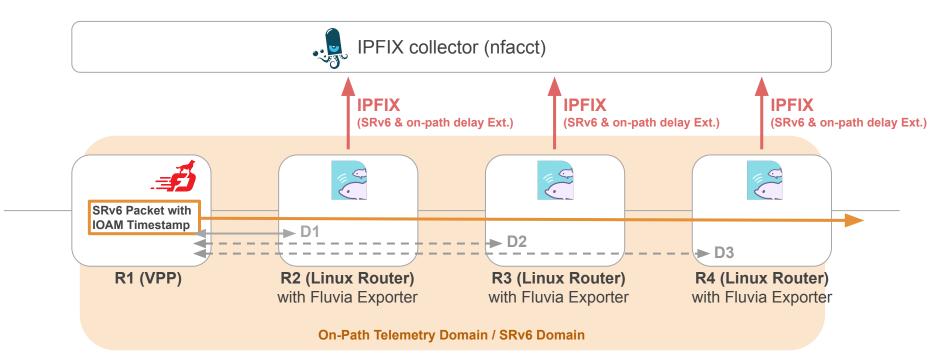
Wireshark:

- COMPLETED: IPFIX IEs for on-path telemetry
 - draft-ietf-opsawg-ipfix-on-path-telemetry-04
- TODO: IOAM Edge-to-Edge Option-Type timestamp format
 - RFC 9197



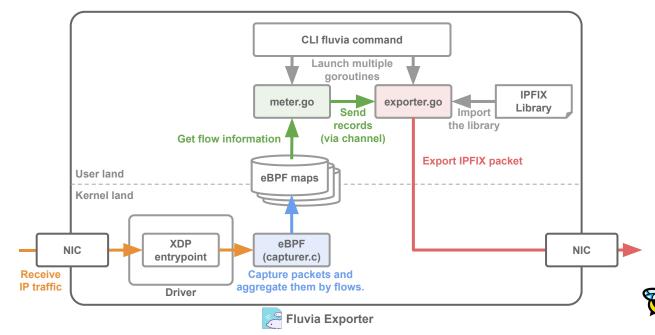
Fluvia Exporter

https://github.com/nttcom/fluvia



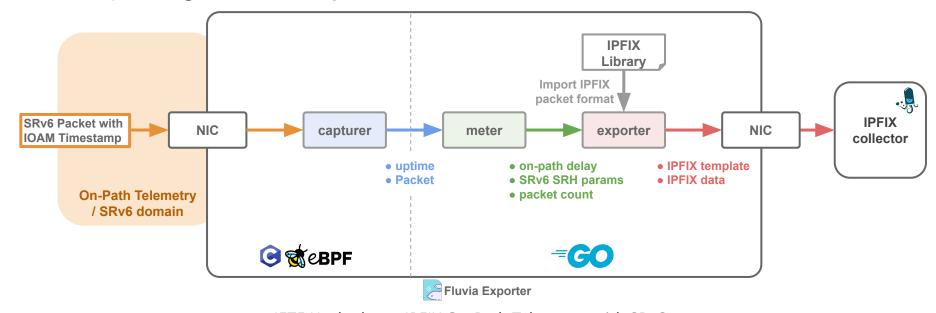
Fluvia Exporter Architecture

- eBPF/XDP based Linux IPFIX exporter
- comprises 3 components (capturer, meter, exporter)



On-Path Telemetry Pipeline

- capturer: collect IOAM timestamp and timestamp of when the packet was arrived
- meter: calculate the delay from each timestamp, parse the SRv6 SRH
- exporter: generate IPFIX packet, and send to a collector



WireShark Dissector

```
Cisco NetFlow/IPFIX
  Version: 10
  Length: 168
> Timestamp: Nov 2, 2023 19:21:36.000000000 JST
  FlowSequence: 1
  Observation Domain Id: 61166
> Set 1 [id=2] (Data Template): 256
v Set 2 [id=256] (1 flows)
     FlowSet Id: (Data) (256)
     FlowSet Length: 104
     [Template Frame: 1]
  v Flow 1
       Packets: 3
       Segment Routing Header Active Segment: fd00:0:0:1002:3::
       Segment Routing Header IPv6 Segments Left: 0x02
     > Segment Routing Header IPv6 Flags: 0x00
       Segment Routing Header IPv6 Tag: 0x0000
     > Segment Routing Header IPv6 Segment Basic List: 0401ee0010fd00000000010020003000000000000fd000000000100...
       Path Delay Mean Delta Microseconds: 0x0002f730
       Path Delay Min Delta Microseconds: 0x0002f6f8
       Path Delay Max Delta Microseconds: 0x0002f74d
       Path Delay Sum Delta Microseconds: 0x0008e592
```

Wrap-up / Our Code

- Fluvia Exporter: https://github.com/nttcom/fluvia/pull/21
 - https://github.com/Yuya9786/fluvia/tree/feature/rebased-ioam6-timestamp

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