What’s hiding behind IPv6 extension headers?

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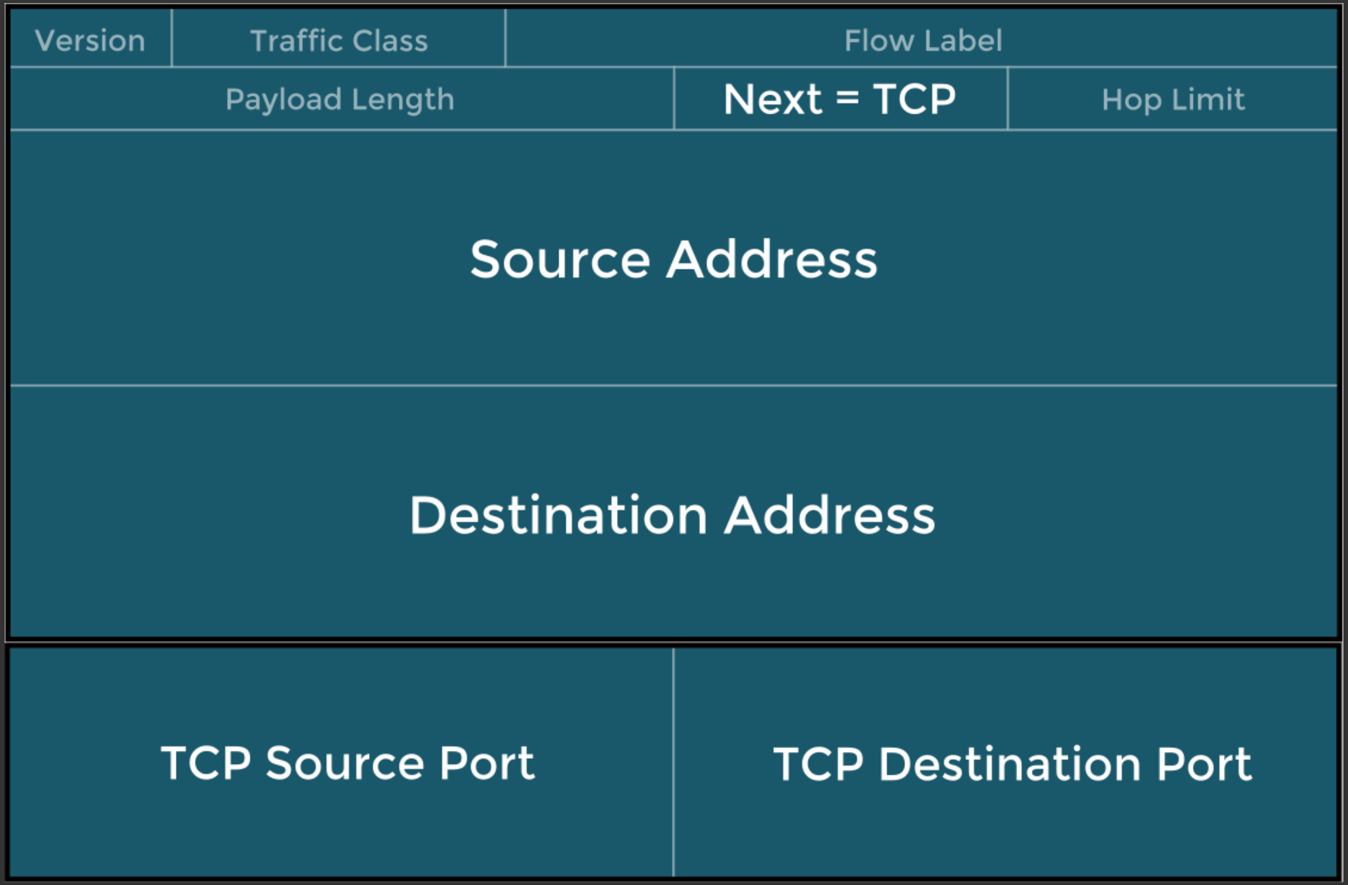
SURF NET

What’s wrong?

Flow-based measurements are based on a *key*, made from specific header fields.

Classic 5-tuple:
L3 src/dst, L4 sport/dport, proto

The classic tuple



Version

Traffic Class

Flow Label

Payload Length

Next = TCP

Hop Limit

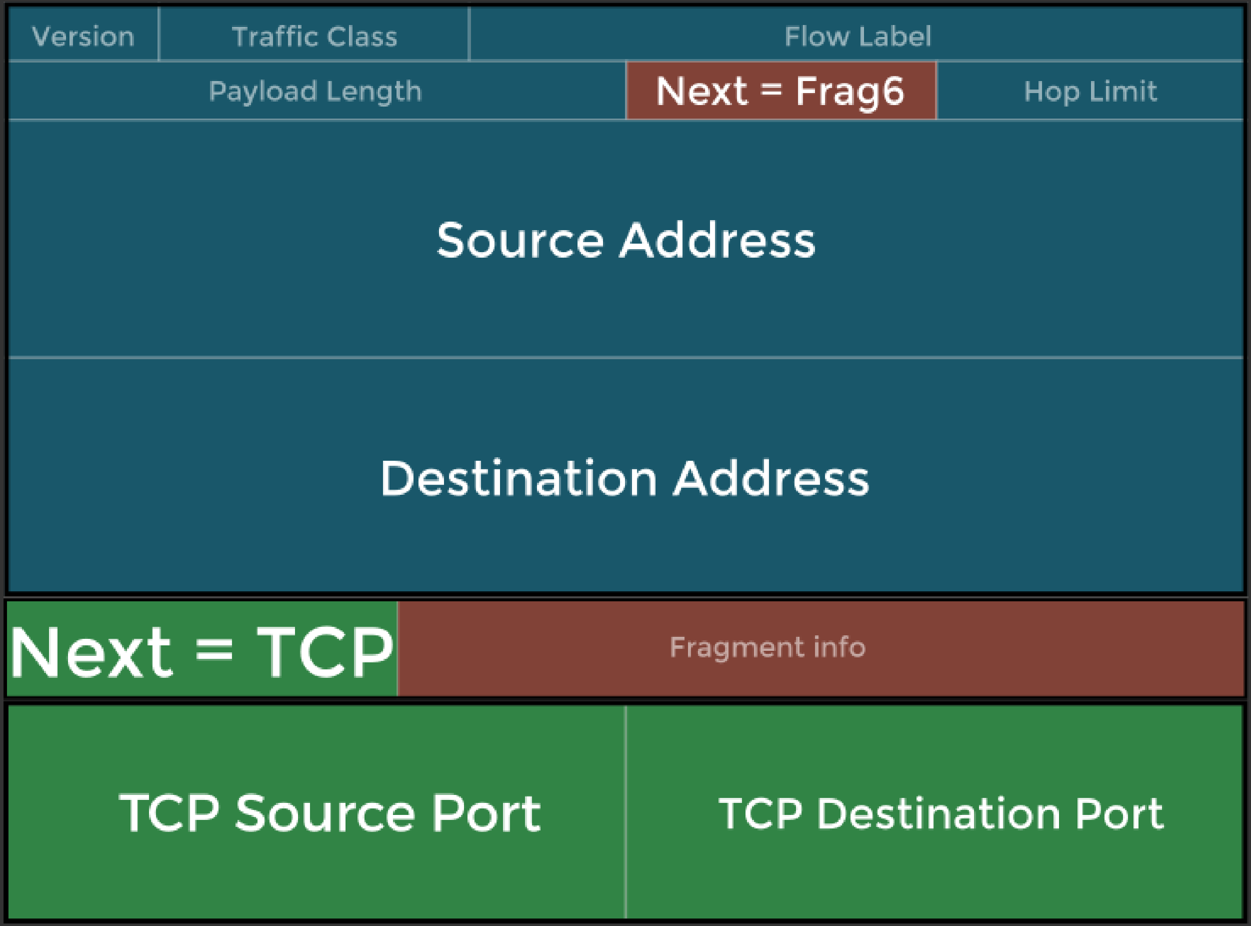
Source Address

Destination Address

TCP Source Port

TCP Destination Port

Enter Extension Headers



Version

Traffic Class

Flow Label

Payload Length

Next = Frag6

Hop Limit

Source Address

Destination Address

Next = TCP

Fragment info

TCP Source Port

TCP Destination Port

When using flow-based measurements,

Extension Headers in IPv6
are **hiding information** on
the **actual upper layer**.

```
Proto      Source address          port
Ipv6-Frag  2001:db8:1:0:4777::140  0
           Destination Address     port
           2001:db8:db8:a120::17   0

pkt  bytes    flows
8     9792     1
```

```
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```

?

?

What’s hidden then?

- Actual upper layer proto
- Actual upper layer sport/dport
- All extension headers after the first one

Furthermore,

- Wrongful aggregation
  hides actual byte/packet/flow counts

Challenges in flow-land

- How can we get the hidden information?
  - Export new fields! But what fields?
- How can we fix the wrongful aggregation?
  - Use a different cache key! But what fields?
- Any collector-side changes?

Implementation

We implented a Flowmon plugin to export

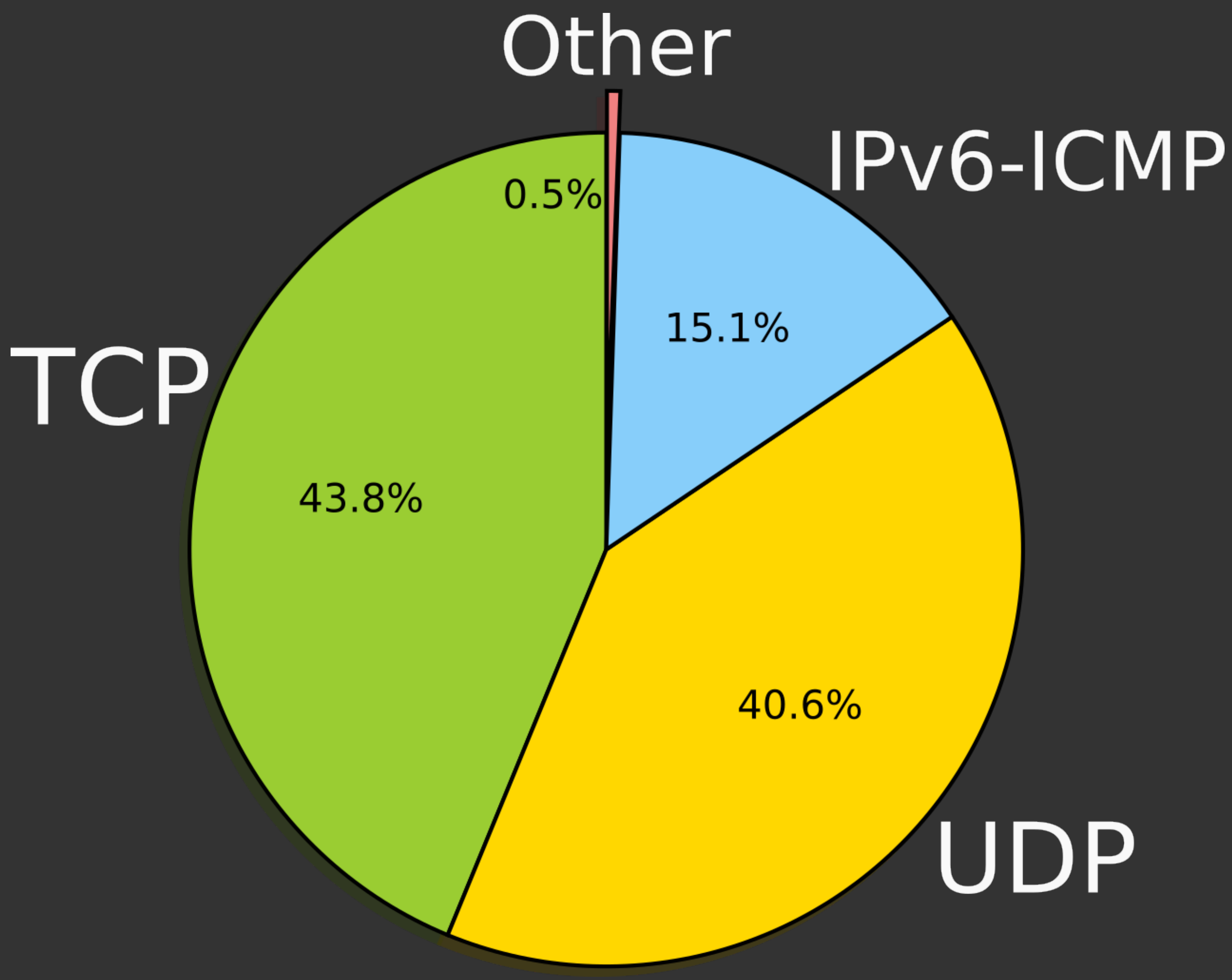
- Upper Proto/~sport/~dport
- Extension header list/~total size

Adapted cache key to include upperProto, upperSport, upperDport

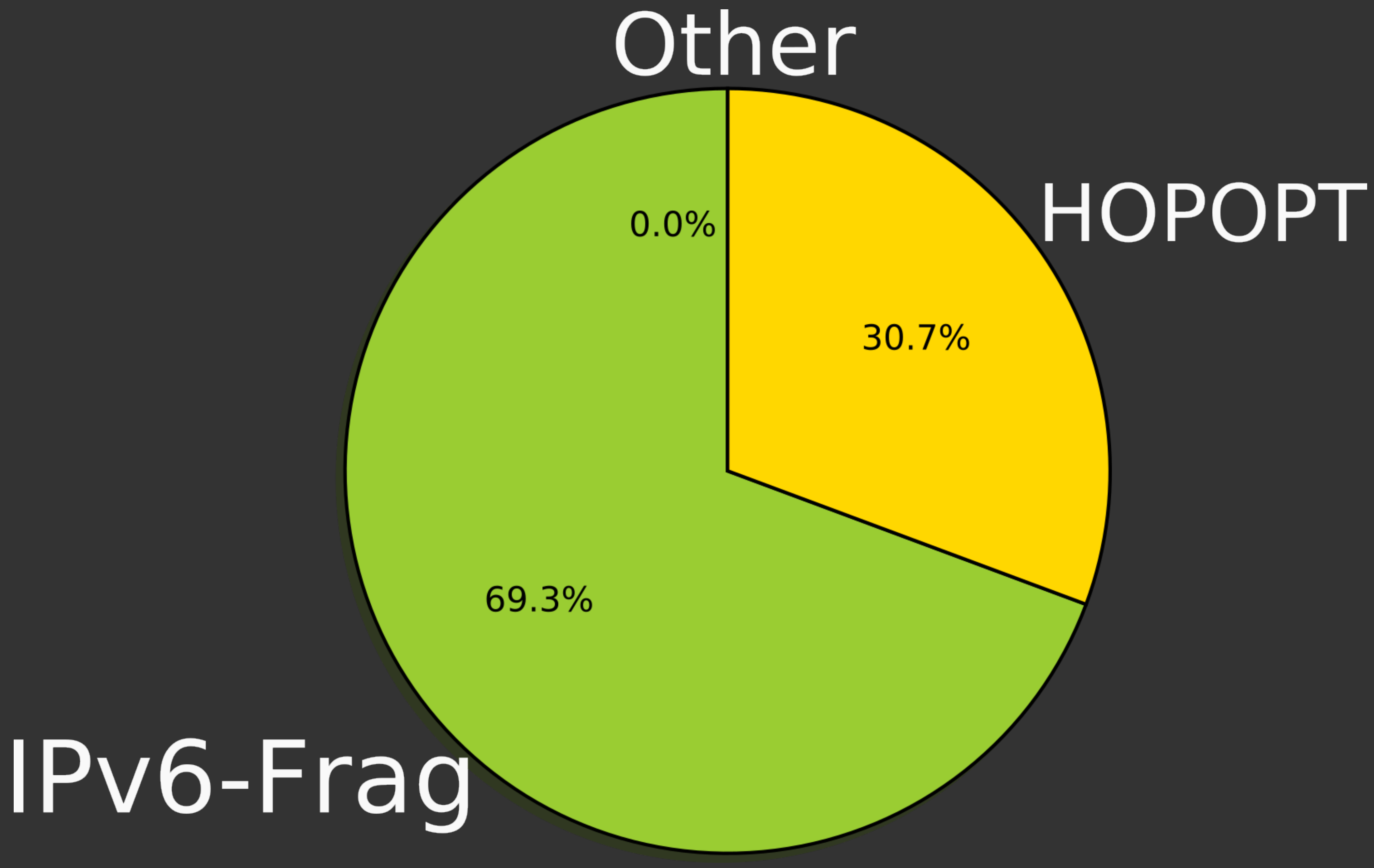
Measurement at CESNET

- May 2016
- 10 links, our plugin on FlowMon probes
- IPv6 flows only
- Unsampled
- Anonymized IP addresses
- 1 single collector

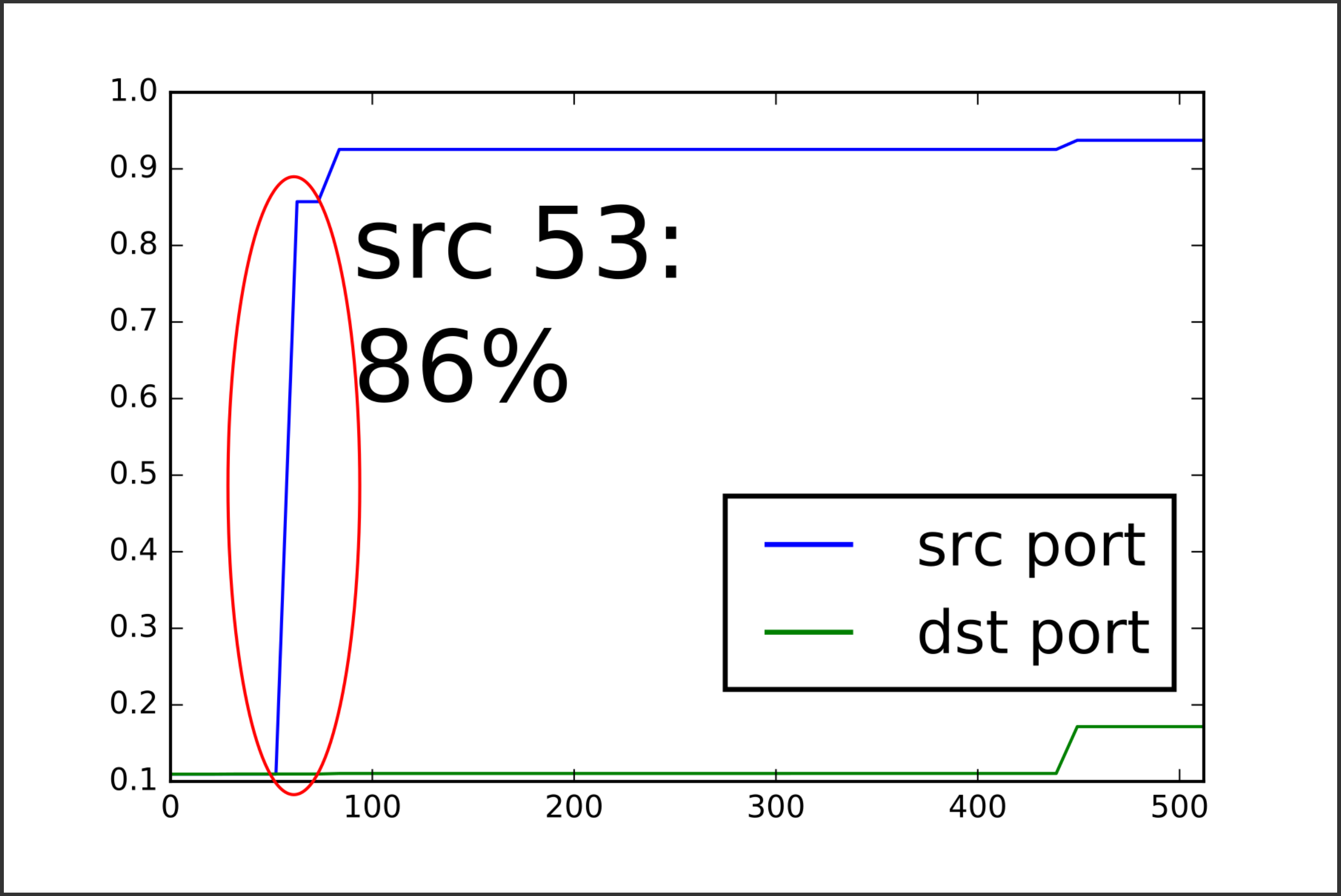
~4000M IPv6 flows



Flows with an Upper Proto



Distribution of Upper TCP ports



Concluding, ...

Share of flows with EHs, is not that big.
However, actual higher layer payload is often
important for (end-user) QoE, e.g. DNS.

Measurement technologies need to
traverse the Extension Header chain,
in order to give **correct** and realistic **results**.

Thank you

Petr Vlan (CESNET)

for support in both plugin development and deployment

Open source software:
Ipfixcol / fbitdump

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As presented at MAT-WG,
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