Order of Information Elements draft-irino-ipfix-ie-order-00.txt
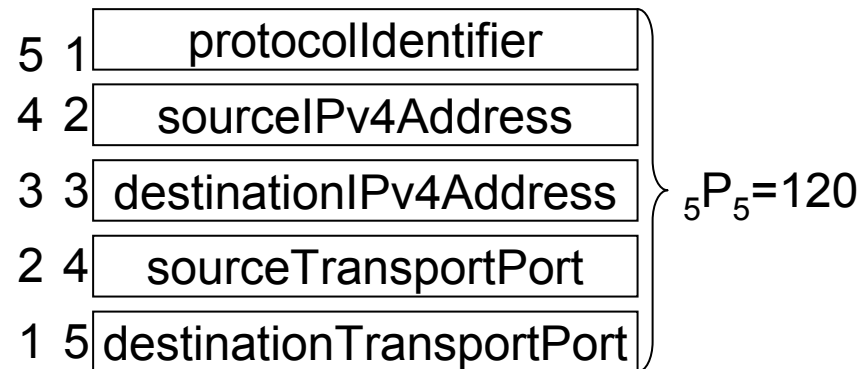
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Motivation

- High performance collectors are needed, because Traffic volume increases
  - Ability to make various combination from same set of IEs makes it difficult to improve performance on collectors

Ex. 5tupple

5	1	protocolIdentifier
4	2	sourceIPv4Address
3	3	destinationIPv4Address
2	4	sourceTransportPort
1	5	destinationTransportPort

$_5P_5 = 120$

  - Fixed template (such as NetFlow v5) can increase performance, but it has no flexibility

- I propose order of Information Elements which has possibility to increase performance without loss of flexibility
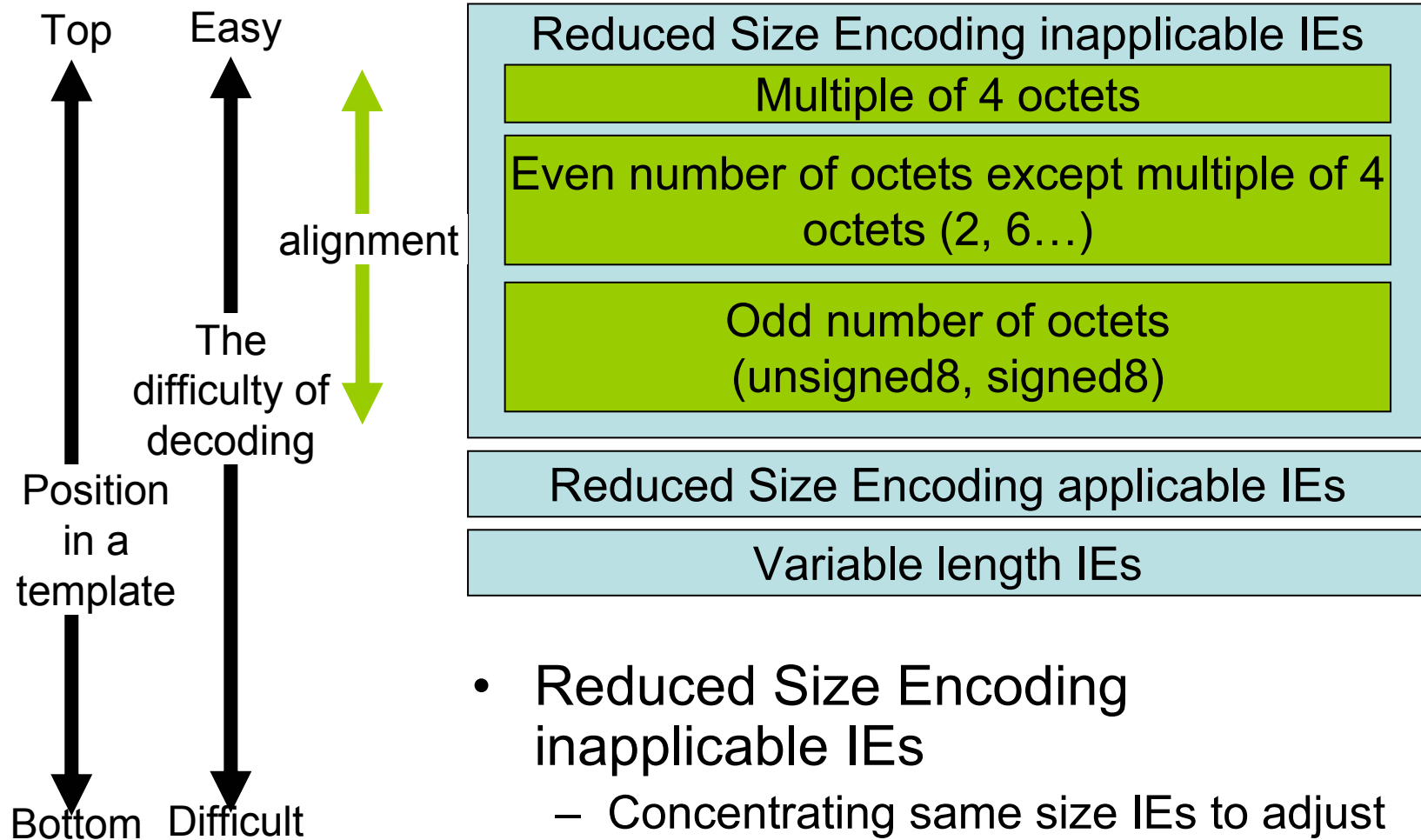
Applicability and Target

- My proposal is useful in carrier size large network.
  - Many routers act as same role (ex. Access router).
  - Same set of IEs are often used in a single domain
    - "Same set of IEs" + "A defined order" -> same template

- My proposal mainly targets Hard-coded implementations whose order cannot be configured
  - Hard-coded exporters export almost same information in the various form of templates. (Ex. NetFlow v9 routers)
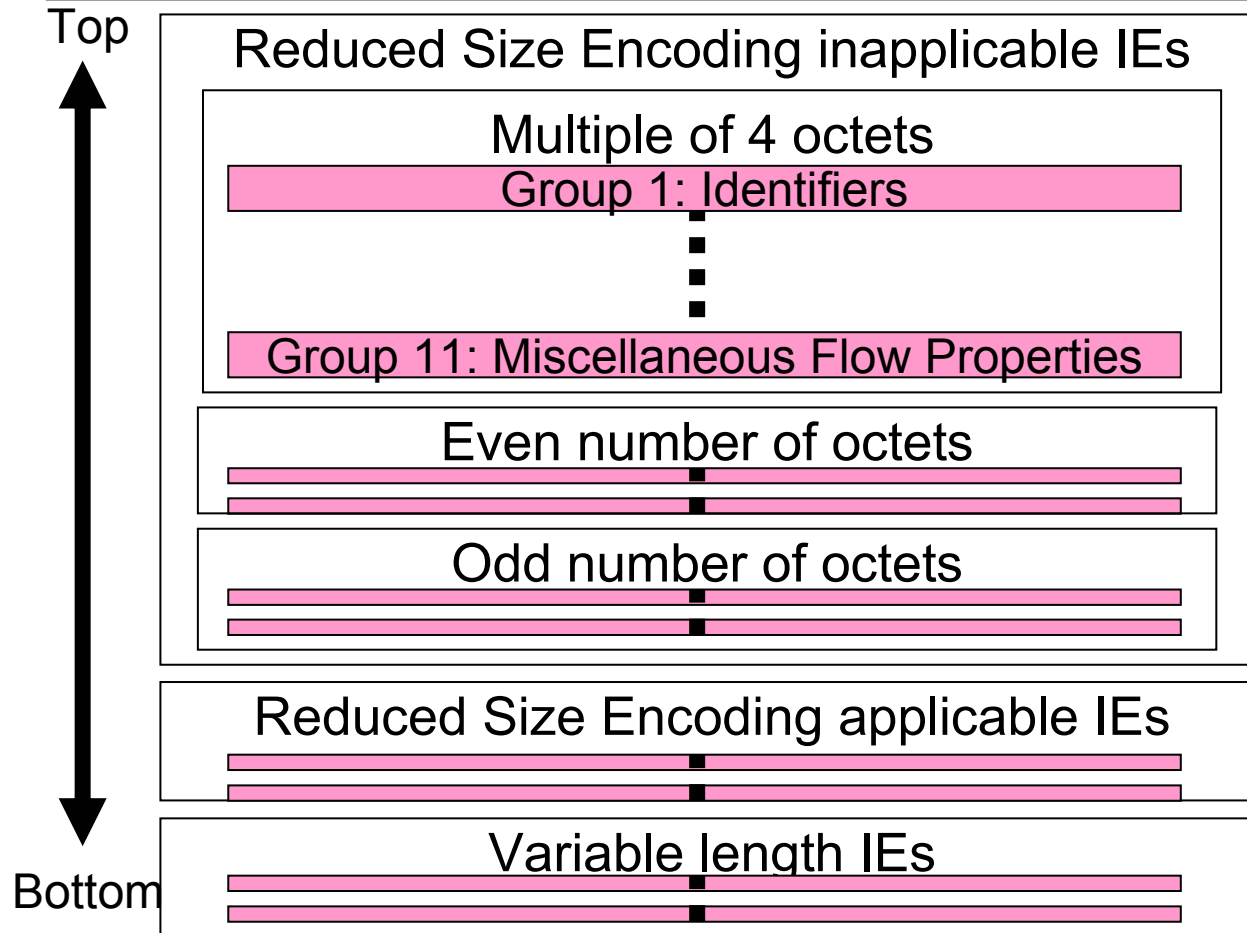
A Concept of the ordering

- I consider the 3-step ordering based on the difficulty of decoding

    1. Data sizes
        - Reduced Size Encoding inapplicable IEs
        - Reduced Size Encoding applicable IEs
        - Variable Length IEs

    2. Group number
        - Group is defined in IPFIX-INFO, IE belong a any group in 12 groups

    3. Order in each group

Ordering Step 1: Data Size

Top   Easy

alignment

The difficulty of decoding

Position in a template

Bottom   Difficult

Reduced Size Encoding inapplicable IEs

Multiple of 4 octets

Even number of octets except multiple of 4 octets (2, 6…)

Odd number of octets (unsigned8, signed8)

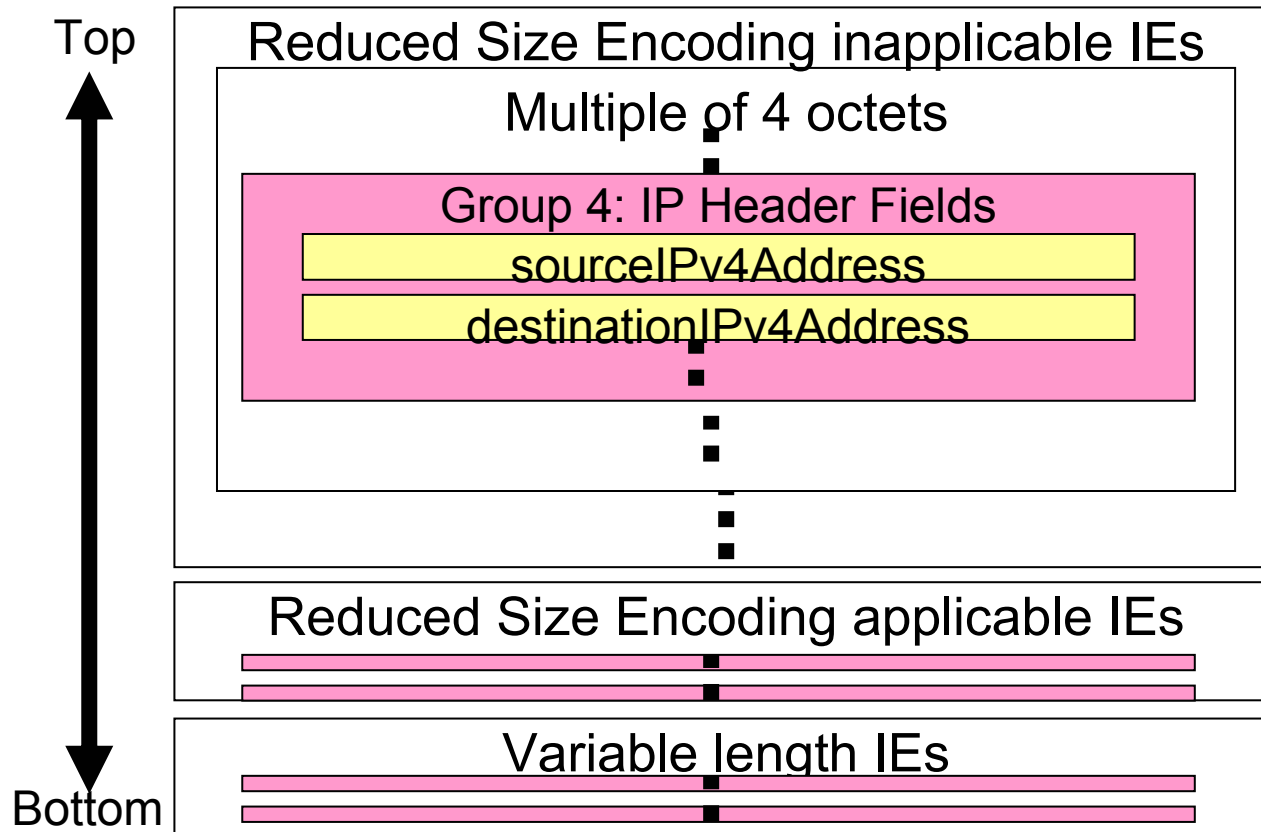**Reduced Size Encoding applicable IEs**

Variable length IEs

- Reduced Size Encoding inapplicable IEs
  - Concentrating same size IEs to adjust data alignment
- Variable Length IEs
  - these affect positions of following IEs

Ordering Step 2: Group number

Top

Reduced Size Encoding inapplicable IEs

Multiple of 4 octets

Group 1: Identifiers

Group 11: Miscellaneous Flow Properties

Even number of octets

Odd number of octets

Reduced Size Encoding applicable IEs

Variable length IEs

Bottom

- An order of the groups are decided by the sequence of the group numbers defined in [IPFIX-INFO].
  - Exception: Counters IEs (belonging to group 3, 10)
    - positioned at the end of position for "Reduced Size Encoding" applicable IEs.

Ordering Step 3: order in each group

Top

Bottom

Reduced Size Encoding inapplicable IEs

Multiple of 4 octets

Group 4: IP Header Fields

sourceIPv4Address

destinationIPv4Address

Reduced Size Encoding applicable IEs

Variable length IEs

- An order of IEs in each group are introduced order described in [IPFIX-INFO]
  - Exception case: opposite meaning IEs
    - flowStart* IEs SHOULD be earlier in the sequence than flowEnd* IEs.
      And flowStart* IEs and flowEnd* IEs SHOULD be adjacent.
    - *source* IEs SHOULD be earlier in the sequence than *destination* IEs. And *source* IEs and *destination* IEs SHOULD be adjacent.

An Example (a template equivalent of NetFlow v5)

sourceIPv4Address	4
destinationIPv4Address	4
ipNextHopIPv4Address	4
sourceTransportPort	2
destinationTransportPort	2
sourceIPv4PrefixLength	1
destinationIPv4 PrefixLength	1
protocolIdentifier	1
ipClassOfService	1
tcpContorolBits	1
ingressInterface	4
egressInterface	4
bgpSourceAsNumber	4
bgpDestinationAsNumber	4
flowStartSysUpTime	4
flowEndSysUpTime	4
octetDeltaCount	4
packetDeltaCount	4

Multiples of 4 octets in reduced size encoding inapplicable IEs

Even number of octets in reduced size encoding inapplicable IEs

Odd number of octets in reduced size encoding inapplicable IEs

Reduced size encoding applicable IEs

Next Action

- Next (-01) Draft
  - Following new Information Elements definition defined in IPFIX-INFO-14
  - Adding applicability

- I started to implement exporter and collector implementation which are applied the order

- I'd like to bring it to wg item.