

# **Export of Structured Data in IPFIX**

**IPFIX IETF-76 Nov 11th, 2009**

**<draft-ietf-ipfix-structured-data-00.txt>**

**Gowri Dhandapani, Paul Aitken, Stan Yates, Benoit Claise**

# Introduction

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- **This draft is an extension to [RFC5101] and [RFC5102]**
  - Support hierarchical structured data and lists (sequences) of Information Elements in data records**
- **Based on draft-claise-structured-data-in-ipfix-02**

# New Abstract Data Type and Information Element: basicList

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## basicList

represents a list of zero or more instances of any single Information Element. Primarily used for single-valued data types.

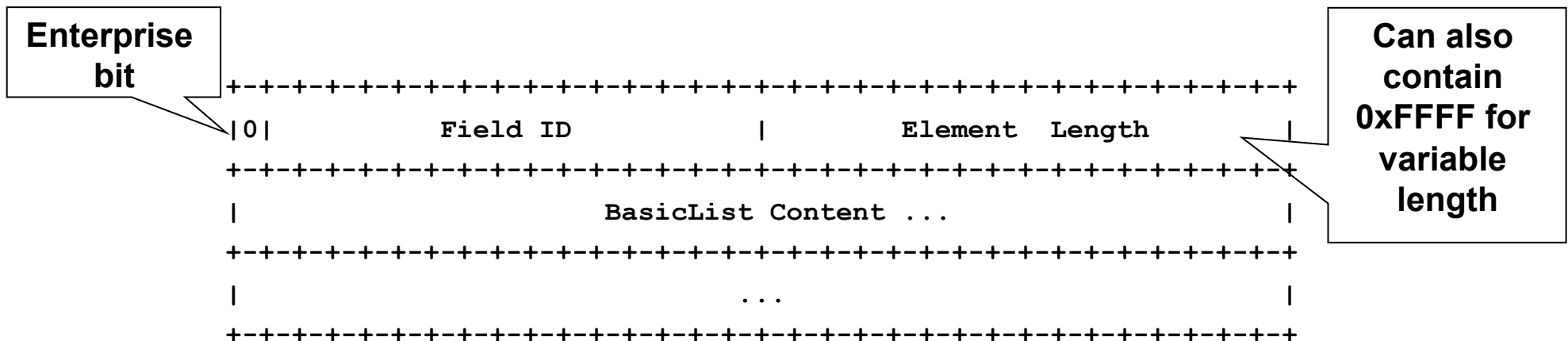


Figure A: basicList Information Element Encoding

**Example: list of output interfaces, list of BGP AS Path, list of port numbers**

# New Abstract Data Type and Information Element: subTemplateList

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## subTemplateList

represents a list of zero or more instances of structured data, where the data type of each list element is the same and corresponds with a single Template Record.

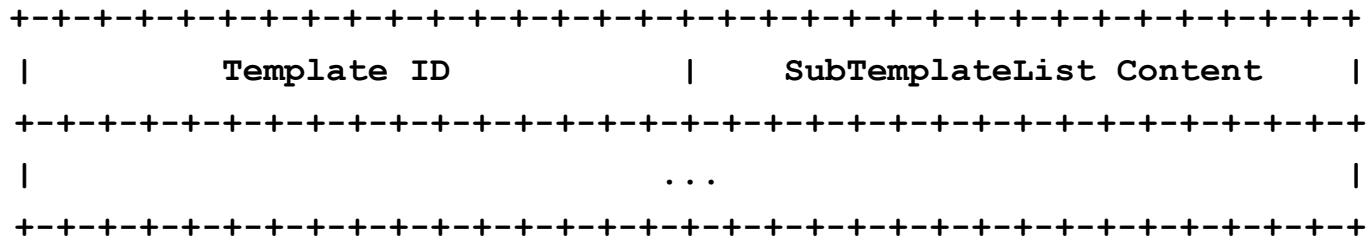


Figure E: subTemplateList Encoding

**Example: MPLS label stack, src/dst IP addresses pairs, performance metric for a fixed tuple**

# New Abstract Data Type and Information Element: subTemplateMultiList

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## subTemplateMultiList

represents a list of zero or more instances of structured data, where the data type of each list element can be different and correspond with different template definitions.

**Example:  
aggregated  
observation point in  
a mediation  
function**

```
+-----+
|      Element 1 Template Id   |      Element 1 Length      |
+-----+
|                               |                               |
|                               |                               |
|                               |                               |
|                               |                               |
|                               |                               |
|      Element 2 Template Id   |      Element 2 Length      |
+-----+
|                               |                               |
|                               |                               |
|                               |                               |
|                               |                               |
|                               |                               |
|      Element N Template Id   |      Element N Length      |
+-----+
|                               |                               |
|                               |                               |
|                               |                               |
+-----+
```

# New in This Version

## Improved subTemplateMultiList Example

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- Flow record (263)
    - | (sourceIPv4Address)
    - | (destinationIPv4Address)
    - | (sourceTransportPort)
    - | (destinationTransportPort)
    - | (protocolIdentifier)
    - | (octetTotalCount)
    - | (packetTotalCount)
    - +----- classification attributes (261)
      - | (selectorId)
      - | (selectorAlgorithm)
    - +----- sampling attributes (262)
      - | (selectorId)
      - | (selectorAlgorithm)
      - | (samplingPacketInterval)
      - | (samplingPacketSpace)
- } subTemplateMultiList
- Some traffic will be filtered according to match properties configured, some will be sampled, some will be filtered and sampled, and some will not be filtered nor be sampled.
  - Selector Report Interpretation [PSAMP RFC 5476]

# **New in This Version**

## **Relationship with Other RFCs**

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- **Changed the subTemplateMultiList encoding to be consistent with set headers**
- **Relationship with Reducing Redundancy [RFC5473]**

**“When Structured Data Information Elements contain repeated elements, these elements may be replaced with a commonPropertiesID Information Element”**

**However, a detailed analysis of the gain has not been done**
- **Relationship with Bidirectional Flow Export [RFC5103]**

**“Encoding Biflows with subTemplateList or subTemplateMultiList provides a more logical division of the information in both directions, although this encoding incurs a small additional bandwidth penalty.”**

**New example in Appendix B**

# New in This Version

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- **Improve BasicList example: a list of outgoing interfaces**  
Requested in the past in draft-kobayashi-ipfix-multicast-measure-00
- **Options Template Set**  
“Structured Data Information Elements MAY be used in Options Template Sets.” is now clearly specified  
Complex aggregated observation point: example and encoding  
Might be useful in an IPFIX Mediator
- **Move the IPS alert example to Appendix C,**  
This demonstrates usage of all structured data Information Elements in a single example



# Only One Open Issue: Logical OR? More Semantic

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- **Example: basicList of egress interfaces in a Flow Record**
  - Has every counted packet been sent on every egress interface?  
= multicast case = AND semantic
  - Has every counted packet been sent on any one of the egress interfaces?  
= load balancing case = OR semantic
- **Solution 1:** the semantic of list content is out of scope, the semantic must be clear from the context or the definition of the Information Elements used within the lists.
- **Solution 2:** We define semantic lists, such as `andBasicList`, `andSubTemplateList`, `andSubTemplateMultiList`, `orBasicList`, `orSubTemplateList`, and `orSubTemplateMultiList`
  - describing AND and OR semantic
  - Logical OR useful in some IPFIX Mediator cases
- **Solution 3:** provide the ability to specify AND, OR, NOT and parenthesis(!) per field
  - eg, "(eth1 OR eth2) AND (NOT (eth3 OR eth4)) OR linecard2"
- **Proposal:** don't go for solution 3

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