IP Flow Information Export (IPFIX) Information Elements Extension for Forwarding Exceptions

draft-mvmd-opsawg-ipfix-fwd-exceptions-00

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Background

- Traffic drops in networks may often go unnoticed unless service is impacted. Detecting & Repairing Traffic drop in networks can be tedious & mechanical.

- To eliminate this tedious workflow, focus can be to simplify localization and build correlation of dropped packets to particular entity.

- Dropped packets may be subject to deep inspection along forwarding-path and sent to a host or software queue along with type of exception, in/out interface information and other relevant meta data.

Introduction

- Exception information may be exported in any format desired.

- This proposal focuses on Extensions to IPFIX for exporting dropped packets exception information via push model.

- Some of the IPFIX Information Elements (IEs) already exist. This draft defines new Information Elements along with corresponding formats.

Forwarding Exceptions

- IEs reported may change based on the forwarding exception reported.

- Following subset of information is key to identify:
  - reason for packet drop,
  - flow which encountered the drop (packet content),
  - additional meta-data e.g. flow direction (ingress/egress), nexthop index, input interface, output interface, etc. on which this packet was flowing.

Field Name	Size (bits)	IANA IPFIX ID
flowDirection	8	61
ingressInterface	32	10
egressInterface	32	14
dataLinkFrameSize	16	312
dataLinkFrameSection	65535	315
commonPropertiesID	64	137

Proposed IE – forwardingExceptionCode

- Exception code entails the forwarding reason/error code that caused traffic drop.

- This list can be expanded in the future as necessary. The data record will have corresponding exception code value to indicate forwarding error that caused the traffic drop.

- An implementation may choose to encode device internal exception codes. In such scenarios, Enterprise Bit must be set to 1 with corresponding Enterprose number.

IANA Considerations:

Name	forwardingExceptionCode
ElementID	TBD
Description	Exception code is an identifier uniquely describing cause of irregularity or traffic drop on a device.
Abstract Data Type	unsigned32
Data Type Semantics	identifier

Proposed IE – forwardingNexthopID

- Reachability to any given destination inside the router is defined using a next-hop which is typically represented in the forwarding path as an index.

- Nexthop-index uniquely identifies the egress path a packet would take to reach the destination.

- This could include information about the outgoing interface, forwarding features configured for the packet path etc.

IANA Considerations:

Name	forwardingNexthopID
ElementID	TBD
Description	Nexthop ID is a unique identifier for a Nexthop on a device.
Abstract Data Type	unsigned64
Data Type Semantics	identifier

Forwarding Exception Templates

```
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                 Set ID = 2              |       Length = N octets      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|              Template ID = 256          |        Field Count = N       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|      forwardingExceptionCode          |       Field Length = 4       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|      forwardingNextHopId              |       Field Length = 8       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|        flowDirection                  |       Field Length = 1       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|       ingressInterface                |       Field Length = 4       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|        egressInterface                |       Field Length = 4       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|       dataLinkFrameSize               |       Field Length = 2       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|     dataLinkFrameSection              |     Field Length = 6553      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                        Padding (opt)                             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

```
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                 Set ID = 2              |       Length = N octets      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|              Template ID = 256          |        Field Count = N       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|      forwardingExceptionCode          |       Field Length = 4       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|        flowDirection                  |       Field Length = 1       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|       commonPropertiesId1             |       Field Length = 8       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|       commonPropertiesId2             |       Field Length = 8       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|       commonPropertiesId3             |       Field Length = 8       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|       commonPropertiesId4             |       Field Length = 8       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|       dataLinkFrameSize               |       Field Length = 2       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|     dataLinkFrameSection              |     Field Length = 65535     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                        Padding (opt)                             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Next steps

- Requesting feedback