

Network Working Group	A. Yourtchenko
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IPFIX Cisco Vendor Specific Information Elements
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[Abstract](#)

This document describes some additional Information Elements of Cisco Systems, Inc. that are not listed in RFC3954.

[Status of this Memo](#)

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1. Introduction

The section 4 of [\[RFC5102\]](#) defines the IPFIX Information Elements in the range of 1-127 to be compatible with the NetFlow version 9 fields, as specified in the ["Cisco Systems NetFlow Services Export Version 9" \[RFC3954\]](#). As [\[RFC3954\]](#) was specified in 2004, it does not contain all NetFlow version 9 specific fields in the range 1-127. The question was asked whether IPFIX Devices should exclusively report the [IPFIX IANA IEs \[IPFIX-IANA\]](#) ? In other words, when upgrading from a NetFlow metering process to an IPFIX Metering Process, should the IPFIX Devices stop reporting NetFlow version 9 specific IEs that were not registered in [IANA \[IPFIX-IANA\]](#) ?

This document is intended to fill the gap in this IE range. That way, IPFIX implementations could export all the IEs specified in IANA, regardless of the range.

2. Terminology

IPFIX-specific terminology used in this document is defined in Section 2 of [\[RFC5101\]](#). As in [\[RFC5101\]](#), these IPFIX-specific terms have the first letter of a word capitalized when used in this document.

3. Information Elements

3.1. fsFlowEntryTotalCount

Description:

This Information Element specifies the current number of all Flow Records that form the parent population as input to the Flow Selection Process.

Abstract Data Type: unsigned64

ElementId: 3

Semantics: quantity

Status: current

Units: flows

RFC EDITOR NOTE: if the [Flow Selection Techniques document \[I-D.ietf-ipfix-flow-selection-tech\]](#) is published before this, then remove this entry. This Information Element is similar to 'fsFlowEntryTotalCount' there.

3.2. samplingInterval

Description:

When using sampled NetFlow, the rate at which packets are sampled - e.g. a value of 100 indicates that one of every 100 packets is sampled. Deprecated in favor of 305 `samplingPacketInterval`.

Abstract Data Type: unsigned32

ElementId: 34

Semantics: quantity

Status: deprecated

Units: packets

[3.3. samplingAlgorithm](#)

Description:

The type of algorithm used for sampled NetFlow: 0x01 Deterministic Sampling, 0x02 Random Sampling. The values are not compatible with the `selectorAlgorithm` field, where "Deterministic" has been replaced by "Systematic count-based" (1) or "Systematic time-based" (2), and "Random" is (3). Conversion is required, see [PSAMP parameters](#) [PSAMP-IANA]. Deprecated in favor of 304 `selectorAlgorithm`.

Abstract Data Type: unsigned8

ElementId: 35

Semantics: identifier

Status: deprecated

[3.4. engineType](#)

Description:

Type of flow switching engine in a router/switch: RP = 0, VIP/Line card = 1, PFC/DFC = 2. Reserved for internal use on the collector.

Abstract Data Type: unsigned8

ElementId: 38

Semantics: identifier

Status: deprecated

[3.5. engineId](#)

Description:

VIP or line card slot number of the flow switching engine in a router/switch. Reserved for internal use on the collector.

Abstract Data Type: unsigned8

ElementId: 39

Semantics: identifier

Status: deprecated

[3.6. ipv4RouterSc](#)**Description:**

This is a platform-specific field. It is used to store the address of a router that is being shortcut when performing the MultiLayer Switching.

Abstract Data Type: ipv4Address

ElementId: 43

Semantics: ipv4Address

Status: deprecated

Reference: [\[CCO-MLS\]](#) describes the MultiLayer Switching.

[3.7. flowSamplerId](#)**Description:**

The unique identifier associated with samplerName.
Deprecated in favor of 302 selectorId.

Abstract Data Type: unsigned8

ElementId: 48

Semantics: identifier

Status: deprecated

[3.8. flowSamplerMode](#)**Description:**

The type of algorithm used for sampling data: 0x01 - deterministic, 0x02 - random sampling. Use with flowSamplerRandomInterval. Deprecated in favor of 304

selectorAlgorithm. The values are not compatible:
selectorAlgorithm=3 is random sampling.

Abstract Data Type: unsigned8

ElementId: 49

Semantics: identifier

Status: deprecated

[3.9. flowSamplerRandomInterval](#)

Description:

Packet interval at which to sample - in case of random sampling. Used in connection with flowSamplerMode 0x02 (random sampling) value. Deprecated in favour of 305 samplingPacketInterval.

Abstract Data Type: unsigned32

ElementId: 50

Semantics: quantity

Status: deprecated

[3.10. classId](#)

Description:

Characterizes the traffic class, i.e. QoS treatment.
Deprecated in favour of 302 selectorId.

Abstract Data Type: unsigned8

ElementId: 51

Semantics: identifier

Status: deprecated

[3.11. samplerName](#)

Description:

Name of the flow sampler. Deprecated in favor of 335 selectorName.

Abstract Data Type: string

ElementId: 84

Status: deprecated

[3.12.](#) flagsAndSamplerId

Description:

Flow flags and the value of the sampler ID (flowSamplerId) combined in one bitmapped field. Reserved for internal use on the collector.

Abstract Data Type: unsigned32

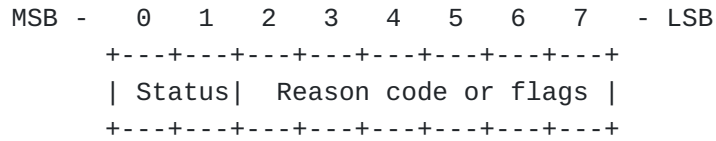
ElementId: 87

Semantics: identifier

Status: deprecated

[3.13.](#) forwardingStatus

The basic encoding is 8 bits. The future extensions could add one or three bytes. The layout of the basic encoding is as follows:



Status:

00b = Unknown
 01b = Forwarded
 10b = Dropped
 11b = Consumed

Reason Code (status = 01b, Forwarded)

01 000000b = 64 = Unknown
 01 000001b = 65 = Fragmented
 01 000010b = 66 = Not Fragmented

Reason Code (status = 10b, Dropped)

10 000000b = 128 = Unknown
 10 000001b = 129 = ACL deny
 10 000010b = 130 = ACL drop
 10 000011b = 131 = Unroutable
 10 000100b = 132 = Adjacency
 10 000101b = 133 = Fragmentation and DF set
 10 000110b = 134 = Bad header checksum
 10 000111b = 135 = Bad total Length
 10 001000b = 136 = Bad header length
 10 001001b = 137 = bad TTL
 10 001010b = 138 = Policer
 10 001011b = 139 = WRED
 10 001100b = 140 = RPF
 10 001101b = 141 = For us
 10 001110b = 142 = Bad output interface
 10 001111b = 143 = Hardware

Reason Code (status = 11b, Consumed)

11 000000b = 192 = Unknown
 11 000001b = 193 = Punt Adjacency
 11 000010b = 194 = Incomplete Adjacency
 11 000011b = 195 = For us

Examples:

value : 0x40 = 64
binary: 01000000
decode: 01 -> Forward
 000000 -> No further information

value : 0x89 = 137
binary: 10001001
decode: 10 -> Drop
 001001 -> Fragmentation and DF set

Description:

The field describes the forwarding status of the flow and any attached reasons. The Reduced Size Encoding rules as per [\[RFC5101\]](#) apply.

Abstract Data Type: unsigned32

ElementId: 89

Semantics: identifier

Status: current

Reference:

See [NetFlow Version 9 Record Format \[CCO-NF9FMT\]](#).

[3.14.](#) srcTrafficIndex

Description:

BGP Policy Accounting Source Traffic Index

Abstract Data Type: unsigned32

ElementId: 92

Semantics: identifier

Status: current

Reference:

BGP policy accounting as described in [\[CCO-BGPPOL\]](#)

[3.15.](#) dstTrafficIndex

Description:

BGP Policy Accounting Destination Traffic Index

Abstract Data Type: unsigned32

ElementId:

93

Semantics: identifier

Status: current

Reference:

BGP policy accounting as described in [\[CCO-BGPPOL\]](#)

[3.16.](#) className

Description:

Traffic Class Name, associated with the classId
Information Element. Deprecated in favor of 335 selectorName.

Abstract Data Type: string

ElementId: 100

Status: deprecated

[3.17.](#) layer2packetSectionOffset

Description:

Layer 2 packet section offset. Potentially a generic
packet section offset.

Abstract Data Type: unsigned16

ElementId: 102

Semantics: quantity

Status: current

EDITOR'S NOTE: [\[I-D.kashima-ipfix-data-link-layer-monitoring\]](#) contains a corresponding field 'sectionOffset' with a better description. One solution is to assign the value 102 for the 'sectionOffset' in [\[I-D.kashima-ipfix-data-link-layer-monitoring\]](#).

[3.18.](#) layer2packetSectionSize

Description:

Layer 2 packet section size. Potentially a generic packet
section size.

Abstract Data Type: unsigned16

ElementId: 103

Semantics:

quantity

Status: current

EDITOR'S NOTE: [\[I-D.kashima-ipfix-data-link-layer-monitoring\]](#) contains a corresponding field 'sectionObservedOctets' with a better description. One solution is to assign the value 103 to 'sectionObservedOctets' in [\[I-D.kashima-ipfix-data-link-layer-monitoring\]](#).

3.19. layer2packetSectionData

Description:

Layer 2 packet section data.

Abstract Data Type: octetArray

ElementId: 104

Status: current

EDITOR'S NOTE: [\[I-D.kashima-ipfix-data-link-layer-monitoring\]](#) contains a corresponding field 'dataLinkFrameSection' with a better description. One solution is to assign the value 104 to 'dataLinkFrameSection' in [\[I-D.kashima-ipfix-data-link-layer-monitoring\]](#).

4. Other Information Elements

4.1. Application Information IEs

ElementId: 101

ElementId: 94 .. 97

Please refer to the [Export of Application Information in IPFIX](#) [*I-D.claise-export-application-info-in-ipfix*]

5. IANA Considerations

This document specifies several new IPFIX Information Elements in the IPFIX Information Element registry as defined in Section 3 above. The following Information Elements must be assigned:

*Information Element Number 3 for the fsFlowEntryTotalCount
Information Element

*Information Element Number 34 for the samplingInterval
Information Element

*Information Element Number 35 for the samplingAlgorithm
Information Element

*Information Element Number 38 for the engineType Information
Element

*Information Element Number 39 for the engineId Information
Element

*Information Element Number 43 for the ipv4RouterSc Information
Element

*Information Element Number 48 for the flowSamplerId Information
Element

*Information Element Number 49 for the flowSamplerMode Information
Element

*Information Element Number 50 for the flowSamplerRandomInterval
Information Element

*Information Element Number 51 for the classId Information Element

*Information Element Number 84 for the samplerName Information
Element

*Information Element Number 87 for the flagsAndSamplerId
Information Element

*Information Element Number 89 for the forwardingStatus
Information Element

*Information Element Number 92 for the srcTrafficIndex Information
Element

*Information Element Number 93 for the dstTrafficIndex Information
Element

*Information Element Number 100 for the className Information
Element

*Information Element Number 102 for the layer2packetSectionOffset
Information Element

*Information Element Number 103 for the layer2packetSectionSize
Information Element

*Information Element Number 104 for the layer2packetSectionData
Information Element

6. Security Considerations

This document specifies the definitions and does not alter the security considerations of the base protocol. Please refer to the security considerations sections of [RFC 3954](#) [RFC3954] and [RFC 5102](#) [RFC5102].

7. References

7.1. Normative References

[RFC5101]	Claise, B., " Specification of the IP Flow Information Export (IPFIX) Protocol for the Exchange of IP Traffic Flow Information ", RFC 5101, January 2008.
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7.2. Informative References

[RFC3954]	Claise, B., " Cisco Systems NetFlow Services Export Version 9 ", RFC 3954, October 2004.
[RFC5102]	Quittek, J., Bryant, S., Claise, B., Aitken, P. and J. Meyer, " Information Model for IP Flow Information Export ", RFC 5102, January 2008.
[PSAMP-IANA]	IANA, "Packet Sampling (PSAMP) Parameters", .
[IPFIX-IANA]	IANA, "IP Flow Information Export (IPFIX) Entities", .
[I-D.ietf-ipfix-flow-selection-tech]	D'Antonio, S, Zseby, T, Henke, C and L Peluso, " Flow Selection Techniques ", Internet-Draft draft-ietf-ipfix-flow-selection-tech-06, May 2011.
[I-D.claise-export-application-info-in-ipfix]	Claise, B, Aitken, P and N Ben-Dvora, " Export of Application Information in IPFIX ", Internet-Draft draft-claise-export-application-info-in-ipfix-01, March 2011.
[I-D.kashima-ipfix-data-link-layer-monitoring]	Kashima, S, Nakata, K and A Kobayashi, " Information Elements for Data Link Layer Traffic Measurement ", Internet-Draft draft-kashima-ipfix-data-link-layer-monitoring-05, March 2011.
[CCO-NF9FMT]	Cisco, "NetFlow version 9 Flow-Record format", .
[CCO-BGPPOL]	Cisco, "BGP Policy Accounting and BGP Policy Accounting Output Interface Accounting Features", .
[CCO-MLS]	Cisco, "IP MultiLayer Switching Sample Configuration", .

[Appendix A.](#) XML Specification of IPFIX Information Elements

```

<?xml version="1.0" encoding="UTF-8"?>

<fieldDefinitions xmlns="urn:ietf:params:xml:ns:ipfix-info"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="urn:ietf:params:xml:ns:ipfix-info
        ipfix-info.xsd">

    <field name="fsFlowEntryTotalCount" dataType="unsigned64"
        group=""
        dataTypeSemantics="quantity"
        elementId="3" applicability="flow" status="current">
        <description>
            <paragraph>
                This Information Element specifies the current number of all
                Flow Records that form the parent population as input to the
                Flow Selection Process.
            </paragraph>
        </description>
    </field>
    <field name="samplingInterval" dataType="unsigned32"
        group=""
        dataTypeSemantics="quantity"
        elementId="34" applicability="flow" status="deprecated">
        <description>
            <paragraph>
                When using sampled NetFlow, the rate at which packets are
                sampled - e.g. a value of 100 indicates that one of every 100
                packets is sampled. Deprecated in favor of 305
                samplingPacketInterval.
            </paragraph>
        </description>
    </field>
    <field name="samplingAlgorithm" dataType="unsigned8"
        group=""
        dataTypeSemantics="identifier"
        elementId="35" applicability="flow" status="deprecated">
        <description>
            <paragraph>
                The type of algorithm used for sampled NetFlow: 0x01
                Deterministic Sampling, 0x02 Random Sampling. The values are not
                compatible with the selectorAlgorithm field, where
                "Deterministic" has been replaced by "Systematic count-based"
                (1) or "Systematic time-based" (2), and "Random" is (3).
                Conversion is required, see PSAMP parameters. Deprecated in
                favor of 304 selectorAlgorithm.
            </paragraph>
        </description>
    </field>
    <field name="engineType" dataType="unsigned8"

```

```

        group=""
        dataTypeSemantics="identifier"
        elementId="38" applicability="flow" status="deprecated">
<description>
    <paragraph>
        Type of flow switching engine in a router/switch: RP = 0,
        VIP/Line card = 1, PFC/DFC = 2. Reserved for internal use on the
        collector.
    </paragraph>
</description>
</field>
<field name="engineId" dataType="unsigned8"
        group=""
        dataTypeSemantics="identifier"
        elementId="39" applicability="flow" status="deprecated">
<description>
    <paragraph>
        VIP or line card slot number of the flow switching engine in a
        router/switch. Reserved for internal use on the collector.
    </paragraph>
</description>
</field>
<field name="ipv4RouterSc" dataType="ipv4Address"
        group=""
        dataTypeSemantics="ipv4Address"
        elementId="43" applicability="flow" status="deprecated">
<description>
    <paragraph>
        This is a platform-specific field. It is used to store the
        address of a router that is being shortcut when performing the
        MultiLayer Switching.
    </paragraph>
</description>
</field>
<field name="flowSamplerId" dataType="unsigned8"
        group=""
        dataTypeSemantics="identifier"
        elementId="48" applicability="flow" status="deprecated">
<description>
    <paragraph>
        The unique identifier associated with samplerName. Deprecated in
        favor of 302 selectorId.
    </paragraph>
</description>
</field>
<field name="flowSamplerMode" dataType="unsigned8"
        group=""
        dataTypeSemantics="identifier"
        elementId="49" applicability="flow" status="deprecated">

```

```

<description>
  <paragraph>
    The type of algorithm used for sampling data: 0x01 -
    deterministic, 0x02 - random sampling. Use with
    flowSamplerRandomInterval. Deprecated in favor of 304
    selectorAlgorithm. The values are not compatible:
    selectorAlgorithm=3 is random sampling.
  </paragraph>
</description>
</field>
<field name="flowSamplerRandomInterval" dataType="unsigned32"
  group=""
  dataTypeSemantics="quantity"
  elementId="50" applicability="flow" status="deprecated">
  <description>
    <paragraph>
      Packet interval at which to sample - in case of random sampling.
      Used in connection with flowSamplerMode 0x02 (random sampling)
      value. Deprecated in favour of 305 samplingPacketInterval.
    </paragraph>
  </description>
</field>
<field name="classId" dataType="unsigned8"
  group=""
  dataTypeSemantics="identifier"
  elementId="51" applicability="flow" status="deprecated">
  <description>
    <paragraph>
      Characterizes the traffic class, i.e. QoS treatment. Deprecated
      in favour of 302 selectorId.
    </paragraph>
  </description>
</field>
<field name="samplerName" dataType="string"
  group=""
  dataTypeSemantics=""
  elementId="84" applicability="flow" status="deprecated">
  <description>
    <paragraph>
      Name of the flow sampler. Deprecated in favor of 335
      selectorName.
    </paragraph>
  </description>
</field>
<field name="flagsAndSamplerId" dataType="unsigned32"
  group=""
  dataTypeSemantics="identifier"
  elementId="87" applicability="flow" status="deprecated">
  <description>

```



```

    <paragraph>
    Flow flags and the value of the sampler ID (flowSamplerId)
    combined in one bitmapped field. Reserved for internal use on
    the collector.
    </paragraph>
  </description>
</field>
<field name="forwardingStatus" dataType="unsigned32"
      group=""
      dataTypeSemantics="identifier"
      elementId="89" applicability="flow" status="current">
  <description>
    <paragraph>
    The field describes the forwarding status of the flow and any
    attached reasons. The Reduced Size Encoding rules as per apply.
    </paragraph>
    <artwork>
      The basic encoding is 8 bits. The future extensions
      could add one or three bytes. The layout of the basic
      encoding is as follows:

      MSB -  0  1  2  3  4  5  6  7  - LSB
            +---+---+---+---+---+---+---+
            | Status| Reason code or flags |
            +---+---+---+---+---+---+---+

    Status:

    00b = Unknown
    01b = Forwarded
    10b = Dropped
    11b = Consumed

    Reason Code (status = 01b, Forwarded)

    01 000000b = 64 = Unknown
    01 000001b = 65 = Fragmented
    01 000010b = 66 = Not Fragmented

    Reason Code (status = 10b, Dropped)

    10 000000b = 128 = Unknown
    10 000001b = 129 = ACL deny
    10 000010b = 130 = ACL drop
    10 000011b = 131 = Unroutable
    10 000100b = 132 = Adjacency
    10 000101b = 133 = Fragmentation and DF set
    10 000110b = 134 = Bad header checksum
    10 000111b = 135 = Bad total Length
  
```

10 001000b = 136 = Bad header length
 10 001001b = 137 = bad TTL
 10 001010b = 138 = Policer
 10 001011b = 139 = WRED
 10 001100b = 140 = RPF
 10 001101b = 141 = For us
 10 001110b = 142 = Bad output interface
 10 001111b = 143 = Hardware

Reason Code (status = 11b, Consumed)

11 000000b = 192 = Unknown
 11 000001b = 193 = Punt Adjacency
 11 000010b = 194 = Incomplete Adjacency
 11 000011b = 195 = For us

Examples:

value : 0x40 = 64
 binary: 01000000
 decode: 01 -> Forward
 000000 -> No further information

value : 0x89 = 137
 binary: 10001001
 decode: 10 -> Drop
 001001 -> Fragmentation and DF set

</artwork>

</description>

</field>

<field name="srcTrafficIndex" dataType="unsigned32"
 group=""
 dataTypeSemantics="identifier"
 elementId="92" applicability="flow" status="current">

<description>

<paragraph>

BGP Policy Accounting Source Traffic Index

</paragraph>

</description>

</field>

<field name="dstTrafficIndex" dataType="unsigned32"
 group=""
 dataTypeSemantics="identifier"
 elementId="93" applicability="flow" status="current">

<description>

<paragraph>

BGP Policy Accounting Destination Traffic Index

</paragraph>

</description>

```
</field>
<field name="className" dataType="string"
      group=""
      dataTypeSemantics=""
      elementId="100" applicability="flow" status="deprecated">
  <description>
    <paragraph>
      Traffic Class Name, associated with the classId Information
      Element. Deprecated in favor of 335 selectorName.
    </paragraph>
  </description>
</field>
<field name="layer2packetSectionOffset" dataType="unsigned16"
      group=""
      dataTypeSemantics="quantity"
      elementId="102" applicability="flow" status="current">
  <description>
    <paragraph>
      Layer 2 packet section offset. Potentially a generic packet
      section offset.
    </paragraph>
  </description>
</field>
<field name="layer2packetSectionSize" dataType="unsigned16"
      group=""
      dataTypeSemantics="quantity"
      elementId="103" applicability="flow" status="current">
  <description>
    <paragraph>
      Layer 2 packet section size. Potentially a generic packet
      section size.
    </paragraph>
  </description>
</field>
<field name="layer2packetSectionData" dataType="octetArray"
      group=""
      dataTypeSemantics=""
      elementId="104" applicability="flow" status="current">
  <description>
    <paragraph>
      Layer 2 packet section data.
    </paragraph>
  </description>
</field>
</fieldDefinitions>
```

Authors' Addresses

Andrew Yourtchenko Yourtchenko Cisco Systems, Inc. De Kleetlaan, 7
Brussels, Diegem B-1831 Belgium Phone: +32 2 704 5494 EMail:
ayourtch@cisco.com

Paul Aitken Aitken Cisco Systems, Inc. 96 Commercial Quay
Edinburgh, EH6 6LX Scotland Phone: +44 131 561 3616 EMail:
paitken@cisco.com

Benoit Claise Claise Cisco Systems, Inc. De Kleetlaan, 6a b1 Diegem
B-1831 Belgium Phone: +32 2 704 5622 EMail: bclaise@cisco.com