        Revision of the tcpControlBits IPFIX Information Element
           draft-trammell-ipfix-tcpcontrolbits-revision-04.txt

Abstract

   This document revises the tcpControlBits IPFIX Information Element as
   originally defined in [RFC5102] to reflect changes to the TCP Flags
   header field since [RFC0793].

Status of This Memo

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1. **Introduction**

   Octets 12 and 13 of the TCP header encode the data offset (header
   length) in four bits, as well as 12 bits of flags. The least
   significant 6 bits of these were defined in [RFC0793] as URG, ACK,
   PSH, RST, SYN, and FIN for TCP control. Subsequently, [RFC3168]
   defined the CWR and ECE flags for Explicit Congestion Notification
   (ECN) negotiation and signaling; [RFC3540] additionally defined the
   NS flag for the ECN Nonce Sum.

   As defined in the IANA IPFIX Information Element Registry
   [IANA-IPFIX], taken from [RFC5102], the tcpControlBits Information
   Element for IPFIX [RFC7011] only covers the original six bits from
   [RFC0793]. To allow IPFIX to be used to measure the use of ECN, and
   to bring the IPFIX Information Element definition in line with the
   current definition of the TCP Flags header field, it is necessary to
   revise this definition.

   The revised definition of the Information Element in Section 2 was
   developed and approved through the IE-DOCTORS process [RFC7013] in
   August 2013. Section 5.1 of [RFC7013] states "This process should
   not in any way be construed as allowing the IE-DOCTORS to overrule
   IETF consensus. Specifically, Information Elements in the IANA IE
   registry which were added with IETF consensus require IETF consensus
   for revision or deprecation". Since the tcpControlBits Information
   Element was defined in [RFC5102], an IETF Proposed Standard, any
   revision of this Information Element definition requires IETF
   Consensus. The publication of this document fulfills that
   requirement.

   The following section defines the revised tcpControlBits Information
   Element as in Section 9.1 of [RFC7013].

2. **The tcpControlBits Information Element**

   ElementId: 6
   Data Type: unsigned16
   Data Type Semantics: flags
   Description: TCP control bits observed for the packets of this
      Flow. This information is encoded as a bit field; for each TCP
      control bit, there is a bit in this set. The bit is set to 1 if
      any observed packet of this Flow has the corresponding TCP control
      bit set to 1. The bit is cleared to 0 otherwise.

      The values of each bit are shown below, per the definition of the
      bits in the TCP header [RFC0793]:
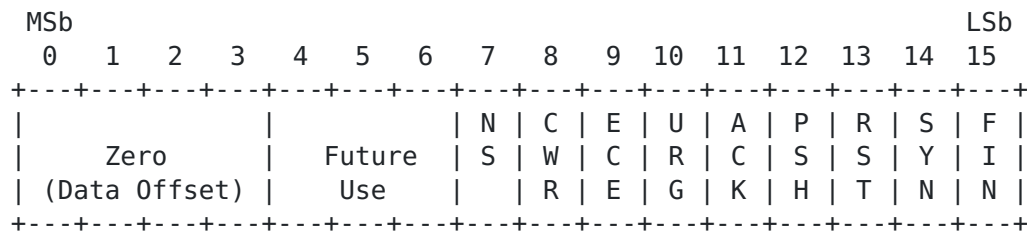
```
 MSb                                                           LSb
   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
 +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
 |               |               | N | C | E | U | A | P | R | S | F |
 |     Zero      |    Future     | S | W | C | R | C | S | S | Y | I |
 | (Data Offset) |     Use       |   | R | E | G | K | H | T | N | N |
 +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

 bit     flag
 value   name   description
 ------+-----+------------------------------------
 0x8000         Zero (see tcpHeaderLength)
 0x4000         Zero (see tcpHeaderLength)
 0x2000         Zero (see tcpHeaderLength)
 0x1000         Zero (see tcpHeaderLength)
 0x0800         Future Use
 0x0400         Future Use
 0x0200         Future Use
 0x0100    NS   ECN Nonce Sum
 0x0080   CWR   Congestion Window Reduced
 0x0040   ECE   ECN Echo
 0x0020   URG   Urgent Pointer field significant
 0x0010   ACK   Acknowledgment field significant
 0x0008   PSH   Push Function
 0x0004   RST   Reset the connection
 0x0002   SYN   Synchronize sequence numbers
 0x0001   FIN   No more data from sender
```

As the most significant four bits of octets 12 and 13 of the TCP
header [RFC0793] are used to encode the TCP data offset (header
length), the corresponding bits in this IE must be exported as
zero and must be ignored by the collector; use the tcpHeaderLength
Information Element to encode this value.

Each of the three future use bits (0x800, 0x400, and 0x200) should
be exported as observed in the TCP headers of the packets of this
Flow, as they may be used subsequent to a future update of
[RFC0793].

If exported as a single octet with reduced size encoding, this
Information Element covers the low-order octet of this field (i.e,
bits 0x80 to 0x01), omitting the ECN Nonce Sum and the three
Future Use bits. A collector receiving this Information Element
with reduced size encoding must not assume anything about the
content of these four bits.

Exporting Processes exporting this Information Element on behalf
of a Metering Process that is not capable of observing any of the
ECN Nonce Sum or Future Use bits should use reduced size encoding,
and only export the least significant 8 bits of this Information
Element.

Note that previous revisions of this Information Element's
definition specified that the CWR and ECE bits must be exported as
zero, even if observed. Collectors should therefore not assume
that a value of zero for these bits in this Information Element
indicates the bits were never set in the observed traffic,
especially if these bits are zero in every Flow Record sent by a
given exporter.

References: [RFC0793][RFC3168][RFC3540]

Revision: 1

3. IANA Considerations

IANA has updated the definition of the tcpControlBits Information
Element in the the IANA IPFIX Information Element Registry
[IANA-IPFIX] to reflect the changes in Section 2 above, changing the
description, data type, and references; incrementing the revision
number; and updating the revision date to the date of the change.

4. Security and Privacy Considerations

This document has no security or privacy considerations; the security
considerations for IPFIX [RFC7011] apply.

5. Acknowledgments

Thanks to Andrew Feren and Lothar Braun for comments on the revised
definition. This work is partially supported by the European
Commission under grant agreement FP7-ICT-318627 mPlane; this does not
imply endorsement by the Commission.

6. References

6.1. Normative References

[RFC0793] Postel, J., "Transmission Control Protocol", STD 7, RFC
           793, September 1981.

[RFC3168] Ramakrishnan, K., Floyd, S., and D. Black, "The Addition
           of Explicit Congestion Notification (ECN) to IP", RFC
           3168, September 2001.

   [RFC3540] Spring, N., Wetherall, D., and D. Ely, "Robust Explicit
              Congestion Notification (ECN) Signaling with Nonces", RFC
              3540, June 2003.

   [RFC7011] Claise, B., Trammell, B., and P. Aitken, "Specification of
              the IP Flow Information Export (IPFIX) Protocol for the
              Exchange of Flow Information", STD 77, RFC 7011, September
              2013.

   [RFC7013] Trammell, B. and B. Claise, "Guidelines for Authors and
              Reviewers of IP Flow Information Export (IPFIX)
              Information Elements", BCP 184, RFC 7013, September 2013.

6.2. Informative References

   [RFC5102] Quittek, J., Bryant, S., Claise, B., Aitken, P., and J.
              Meyer, "Information Model for IP Flow Information Export",
              RFC 5102, January 2008.

   [IANA-IPFIX]
              Internet Assigned Numbers Authority, ., "IP Flow
              Information Export Information Elements
              (http://www.iana.org/assignments/ipfix)", .

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