        Revision of the tcpControlBits IPFIX Information Element
          draft-trammell-ipfix-tcpcontrolbits-revision-02.txt

Abstract

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

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 [I-D.ietf-ipfix-protocol-rfc5101bis] 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 [I-D.ietf-ipfix-ie-doctors] in August 2013. Section 5.1 of [I-D.ietf-ipfix-ie-doctors] 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 [I-D.ietf-ipfix-ie-doctors].

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]:
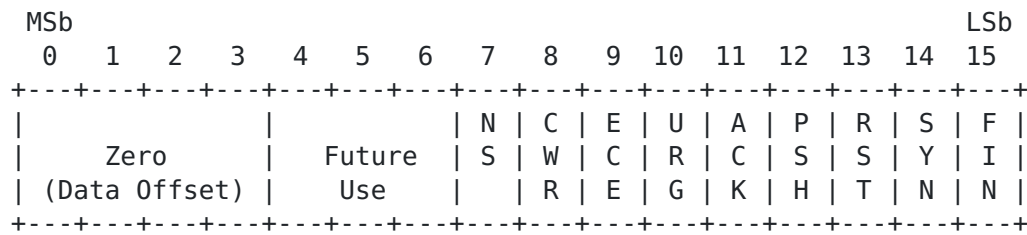
```
  MSb                                                           LSb
    0   1   2   3   4   5   6   7   8   9   10  11  12  13  14  15
   +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
   |               |           | N | C | E | U | A | P | R | S | F |
   |     Zero      |   Future  | 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 one if the corresponding bit is observed in the TCP
   headers of the packets of this Flow, as they may be subsequent to
   a future update of [RFC0793].

   If exported as a single octet with reduced length 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 length encoding must not assume anything about the
   content of these four bits.

      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 will update 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.

4. Security and Privacy Considerations

   This document has no security or privacy considerations; the security
   considerations for IPFIX [I-D.ietf-ipfix-protocol-rfc5101bis] apply.

5. Acknowledgments

   Thanks to Andrew Feren 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

   [I-D.ietf-ipfix-protocol-rfc5101bis]
              Claise, B. and B. Trammell, "Specification of the IP Flow
              Information eXport (IPFIX) Protocol for the Exchange of
              Flow Information", draft-ietf-ipfix-protocol-rfc5101bis-10
              (work in progress), July 2013.

   [I-D.ietf-ipfix-ie-doctors]
              Trammell, B. and B. Claise, "Guidelines for Authors and
              Reviewers of IPFIX Information Elements", draft-ietf-
              ipfix-ie-doctors-07 (work in progress), October 2012.

   [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.

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)", .

Authors' Addresses

   Brian Trammell
   Swiss Federal Institute of Technology Zurich
   Gloriastrasse 35
   8092 Zurich
   Switzerland

   Phone: +41 44 632 70 13
   Email: trammell@tik.ee.ethz.ch

   Paul Aitken
   Cisco Systems, Inc.
   96 Commercial Quay
   Commercial Street, Edinburgh EH6 6LX
   United Kingdom

   Phone: +44 131 561 3616
   Email: paitken@cisco.com