Hardware Timestamp Insertion to aid Certification

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Objective

• Prior ethernet based time scheduled aerospace networks (such as TTP – Time Triggered Protocol) required specialized test infrastructure to capture timestamps “on the wire”
  • Ethernet timestamp is necessary but not sufficient
  • Complements software payload timestamp / metadata
• Propose hardware timestamp insertion by bridges and end points
Existing Implementations

• Vendor locked layer 1 schemes
  • Extends layer 1 preamble / FCS / trailer

• IEEE standardized layer 2 header chaining
  • i.e., Cisco ttag (Ethertype 0x8905)

• Timestamp insertion should be as close to wire as possible
  • After gate control
Wireshark Cisco ttag sample

Frame 1: 118 bytes on wire (944 bits), 118 bytes captured (944 bits)
  Source: Cisco_23:64:c1 (00:1c:58:23:64:c1)
  Type: Unknown (0x8905)
  Cisco ttag, Timestamp: 75866.380934056
  802.1Q Virtual LAN, PRI: 7, DEI: 1, ID: 2472
  Internet Protocol Version 4, Src: 10.145.105.1, Dst: 239.1.37.11
  User Datagram Protocol, Src Port: 50371, Dst Port: 50371
  Data (64 bytes)

0000 80 15 62 64 33 41 00 1c 58 23 64 c1 89 05 45 00  b5dA` X刚  E
0010 00 64 f9 a8 81 00 f9 a8 08 00 45 00 00 00 00 00  d...  E\N
0020 00 00 01 11 a0 d8 0a 91 69 01 ef 01 25 0b 0c6  c3 1%
0030 c4 c3 00 48 0e 0d 01 00 00 00 00 00 00 34 ea e4  H  4
0040 f0 00 42 9a 9e 02 42 52 e4 d4 42 4a 90 51 42 59  B * BR * B\QBY
0050 a7 3c 42 03 e6 44 42 06 97 82 42 8d f2 eb 42 aa  <B\DB\B\B
0060 b6 d1 00 01 1f ff 42 0c 49 24 42 06 c2 99 42 03  B * I$B\B
0070 e6 44 42 06 97 82
Proposal

• Consider specifying timestamp insertion in aerospace profile
• Could be optional feature ("may"), but needs to be defined in the standard for interoperability.
• Last resort – informative annex as guidance?
• Discussion/feedback?