Updates for IPPM's Framework: Packets of Type-P and Standard-Formed Packets

draft-morton-ippm-2330-stdform-typep-01

A. Morton, J.Fabini, N.Elkins, M.Ackermann, V.Hegde

mailto:draft-morton-ippm-2330-stdform-typep@ietf.org

Motivation

- IPv6 deployment
  - Increasing use of IPv6
  - Extension headers
  - Header compression

- **Main trigger:** GEN-ART review of RFC 2679-bis

  Input by Brian Carpenter: **no IPv6 coverage**
  - Dedicated solution for RFC 2679-bis only?
- Generally applicable solution for IPPM framework is a **MUST**
  - Any IPPM metric that has IPv6 coverage (handles IPv6 packets)
  - In particular draft-ietf-ippm-6man-pdm-option-01
- Observations as part of earlier IPPM work
  - IPv6 did not fit into the context of RFC 7312, update postponed.

Scope

- **High-level scope:**
  Highlight additional aspects of measurement packets and make them part of the IPPM performance metric framework.

- **Proposal** (by Al): **Update RFC 2330**
  - Two central concepts of RFC 2330 have explicit dependence on IPv4 and must be updated for IPv6:
  - a) Packet **Type-P** and b) **Standard-formed packet** concept

- **Technical Details:**
  - Expand Type-P examples in section 13 of [RFC2330]
  - Expands definition (in section 15 of [RFC2330]) of a standard- formed packet to include IPv6 header aspects and other features.

Recap RFC 2330 Definitions: Type-P

RFC 2330, Sec. 13:

- "A fundamental property of many Internet metrics is that the **value of the metric depends on the type of IP packet(s)** used to make the measurement…"
- …"Whenever a metric's value depends on the type of the packets involved in the metric, the **metric's name will include either a specific type or a phrase such as "type-P".**
- …"**Generic notion of a "packet of type P"…**
  - Fully defined (port-http-tcp-connectivity-50byte-payload)
  - Partially defined (UDP packet)
  - Generic
- **Type-P becomes part of any metric definition**
  - Example: Define "IP-Type-P-connectivity" metric instead of "IP- connectivity" metric

RFC 2330 **Update**: Type-P

- Mention **special treatment of packets**
  - Diffserv, ECN, Router alert, extension headers, …
- Identify case when **Type-P changes along the path**
  - Type and length changes because of IPv4 <-> IPv6 translation, or IPv6 extension headers adding or removal
  - Modified values SHOULD be noted and reported with the results
- Discuss possible **impact of NAT** along path
  - Unpredictable impact on delay
  - Stateful NAT: state created on first packet: delay penalty
- RFC2330 Note: **class C equivalence** for path
  - …"it would be very useful to know if a given Internet component treats equally a class C of different types of packets. If so, then any one of those types of packets can be used for subsequent measurement of the component. This suggests we devise a metric or suite of metrics that attempt to determine C."

Recap RFC 2330 Definitions: Std-Formed

RFC 2330, Sec. 14:

- "…all **metric definitions** … include an **implicit assumption that the packet is *standard formed*"...**
- "…a packet is standard formed if it meets all of the following **criteria**:…"
  - Length (IP header) = sizeof (IP header) + sizeof(payload)
  - Valid IP header: "**version field is 4 (later, we will expand this to include 6)**" (quote RFC2330!)
  - Header length >= 5, checksum is correct, no IP fragment.
  - Src and dest addr. correspond to the hosts in question.
  - TTL sufficiently large or 255
  - No IP options unless explicitly noted.
  - If transport header is present: valid checksum and fields.
  - Length B: 0 <= B <= 65535 …

RFC 2330 **Update**: Std-Formed Packet

- **IPv4 and IPv6** allowed
- Basic requirements (aggregated IPv4 and IPv6):
  - Valid IP header
  - Not an IP fragment.
  - Source and Destination addresses intended.
  - Transport header: valid checksum and valid fields
- Separate discussion of IPv4 and IPv6
  - IPv4 unchanged
- IPv6
  - Version field 6, total length including extension headers
  - Extension headers: none or correct types and correct order, extension header parameters conforming with IANA
  - Note controversies (RFCs 6564 and 7045) : intermediate nodes inspect/add/delete/change IPv6 extension headers

Next Steps

- **Urgent need to update IPPM for IPv6**
- Draft scope and structure is stable
- Feedback and Input requested

- Adopt as IPPM WG item?

Contact (all draft authors):

mailto:draft-morton-ippm-2330-stdform-typep@ietf.org