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

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