IPv6 Updates for IPPM's Active Metric Framework

draft-ietf-ippm-2330-ipv6-00

A. Morton, J.Fabini, N.Elkins, M.Ackermann, V.Hegde
mailto:draft-ietf-ippm-2330-ipv6@ietf.org
How it all began...

- Any {RFC|draft|metric} that references **IPv6 is out of scope of the RFC2330 IPPM framework!**
  - RFC2330, sec. 15 “…includes a valid IP header: the version field is 4 (later, we will expand this to include 6)”…

- **Trigger:** July 2015, GEN-ART review of RFC 2679-bis

- **Input by Brian Carpenter:** **no IPv6 coverage**
  - RFC 2679-bis only vs. IPPM update
  - Decision for IPPM update

- **Solution:** “Outsource” IPv6-support for IPPM to dedicated draft
  - Precondition for –bis RFCs to pass GEN-ART and IESG review
  - More drafts pending in the queue (active-passive, Avoid replication: one document can do the update for all.
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.
Status

- Draft presented at IETF94 (Yokohama) and IETF95 (BA, remote participation).
- Unanimous consensus that the IPv6 support for IPPM is urgently needed.
- **Call for adoption: Adopted as WG item: June 2016.**
  - New document title:
  - “IPv6 Updates for IPPM's Active Metric Framework”
  - Renamed: draft-ietf-ippm-2330-ipv6
• New input by Fred Baker: Review, focus IPv6

  • **Grammar** – standard(ly)-formed

  • **TTL/hop limit** change: applicability for IPv6 (Neighbor Discovery)
    • Might be relevant test

  • **Fragmentation**: IPv4 discouraged, IPv6 TBD handling
    • Large video frames do get fragmented

  • **Header compression** – separate section

  • **Extension header treatment in intermediate nodes**:
    • Solution needed, seeking 6man feedback and align
Next Steps

• Integrate feedback
  • Draft scope and structure is stable
  • More WG feedback and Input requested

• Ongoing discussions in 6man and v6ops
  • Likely ipv6 draft dependencies on outcome
  • Monitor and update draft
  • (need timeframes)

• Timeline and Milestones
  • WGLC-ready at IETF99 (Prague, 07/2017)

Contact (all draft authors):
mailto:draft-ietf-ippm-2330-ipv6@ietf.org
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