IPv6 Updates for IPPM's Active Metric Framework

draft-ietf-ippm-2330-ipv6-00

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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.
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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).
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- Unanimous consensus that the IPv6 support for IPPM is urgently needed.
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- **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

Status (ctd.)

- 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)

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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
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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