Advanced Unidirectional Route Assessment (AURA)

draft-amf-ippm-route-01

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Background & Inputs

- Route Metric developed, then Introduced before IETF-99
- Rüdiger Geib's comments became our initial To Do List (7 items), replies, p/o -99 slides.
- Interim: Ext. comments: Carlos Pignataro
  - Many [CMP] comments addressed
  - Several remain: discuss TODAY! (Expand Scope)
- Off-list comments from Frank Brockners
- THANKS to reviewers so far
- https://tools.ietf.org/rfcdiff?url2=draft-amf-ippm-route-01.txt

Major Update: Hops!

- Each Route represented as an ordered graph:

`Src=h(0,1), h(1,1), h(2,1), h(3,1), ... h(N1,1)=Dst`

- **`h(i,j)`** was a host, but we can learn more...
  - Now, it's a HOP
  - MUST include Host Identity
  - Arrival Interface ID
  - Departure Interface ID
  - Arrival Timestamp
  - Round-trip Delay Measurements

Foundation of New Components

- Host Identity:
  - (IP) Address(es) host reveals when communicating
  - Normal communication and Error conditions
- Discoverable Host:
  - (IP) sends ICMP Time Exceeded when discarding
  - (IP) RFC 1122 and RFC 1812
- Cooperating Host:
  - MUST respond with Identity to interrogation, SHOULD provide other info (RFC 2119 terms)
- Can generalize beyond IP as needed

Questions for the IPPM WG

- Expand Scope beyond IP? MPLS Ping & Tracert
  - RFC 8029 Deterministic Multipath & Timestamps
  - Can be applied to IP (already in IPv6 Datacenter)
  - <Open Mic Now>
- IF MPLS is in, where do we draw the line?
  - Downstream mapping proposed: nvo3; Facebook UDP
  - Segment Routing allows delay meas. from NetMgtSys
- Reporting the Metric: suggestions? (@ANRW)

Methods of Measurement

- Two Classes, with likely different scopes
  - Active & Multiple Domain
  - Hybrid & Single Domain (at first?)
- Added 2119 Req's to Paris-Traceroute (active)
- Clarified Checksum calculations
- New Subsection on combining diff Methods
  - Ingress Hosts BOTH Discoverable and Cooperating
  - Key is overlapping Host Identities

Discussion/Development Areas

- Interaction between Host Identity and ability to discern Subpaths
- Temporal Composition for Route Metrics
  - Past measurements influence current measure
- Assessment at IP-layer reveals the Route Ensemble for “IP and Higher”
- Hop/Route treats a Class C of Packets equally
  - very useful to know, incorporate as a Parameter
  - a concept of RFC 2330 & RFC 7799

To Do

- CMP: Packet Fields can ID a Flow (RFC 6438)
- CMP: Interface name and MTU (RFC 5837)
  - Use with Traceroute
- CMP: Add Cautions for Methods
  - Try to avoid good measurements used badly
- CMP: Paris Tracert covers IPv6 & Flow Label?
- FB: Method using IOAM Loopback bit (UDP pinger)
- If +MPLS, mention TTL Propagate RFC 4950

Next Steps

- Please Read and send your Review to the list
- WG adoption of this draft?
  - (Now that we have a clearer view of the scope)
  - *Metric side* of the Telemetry Data (IOAM)
- WG could create a milestone for this work, if IPPM wants it on our charter…
  - Dec 2018 –

BACKUP

Route Ensemble (not showing Src=`h(0,j)`)

```
Route Ensemble = {
    {h(1,1), h(2,1), h(3,1), ... h(N1,1)=Dst},
    {h(1,2), h(2,2), h(3,2),..., h(N2,2)=Dst},
    ...
    {h(1,m), h(2,m), h(3,m), ....h(Nm,m)=Dst}
}
```