Advanced Unidirectional Route Assessment (AURA)

draft-amf-ippm-route-01

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Background & Inputs

• Route Metric developed, then Introduced before IETF-99, WG adopted post-IETF-100

• Scope Discussion@IETF-100
  – Charter limits direct coverage
  – Can make definitions more general
  – Consider what work/applicable layers needed
  – Added Carlos Pignataro [CMP] as co-author

• THANKS to reviewers so far:
  – Rüdiger Geib, Frank Brockners
Generalize: Definitions

• Scope: Internet/IP;
  – “applicable to other network domains, if desired”

• Host Identity:
  – The unique address for hosts communicating within the network domain. (e.g., Globally Routable IP address)
  – The Address for Normal comm and Error conditions

• Discoverable Host:
  – Hosts that convey their Host Identity according to the requirements of their network domain, such as when error conditions are detected
  – (IP) sends ICMP Time Exceeded when discarding
  – (IP) RFC 1122 and RFC 1812
Generalize: Definitions + more

• Cooperating Host:
  – MUST respond with Identity to interrogation, SHOULD provide other info (RFC 2119 terms)

• Remainder of Section 3:
  – IPaddrs, TTL, other layer-specific terms > general
  – Hop
  – Member Route
  – Route Ensemble
Questions for the IPPM WG

• +Appendix? Illustrate applicability beyond IP?
  – Spencer: “consider first whether work needs to be done”

• Candidate: MPLS Ping & Tracert
  – RFC 8029 Deterministic Multipath & Timestamps
  – Can be applied to IP (already in IPv6 Datacenter)
  – RFC 6374 for Loss & Delay Measurement (Greg)

• Reporting the Metric: suggestions?
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 Appendix:
  – mention TTL Propagate RFC 4950
Discussion/Development Areas

• Temporal Composition for Route Metrics
  – Past measurements influence current results
  – Can we spot-check past measurements at critical hops? (reduce measurement load & time)
• Hop/Route treats a Class C of Packets equally
  – very useful to know, incorporate as a Parameter
  – a concept of RFC 2330 & RFC 7799
• Interaction between Host Identity and ability to discern Subpaths
• Assessment at IP-layer reveals the Route Ensemble for “IP and Higher”
Next Steps

• Complete ToDo work items
• Continue Development/Discussion items

• Please Read and send your Review to the list
  – Especially sections 4, 5, & 6 RT Delay and Analysis
BACKUP
Hops!

• Each Route represented as an ordered graph:
  \[ \text{Src}=h(0,1), h(1,1), h(2,1), h(3,1), \ldots h(N1,1)=\text{Dst} \]

• \( h(i,j) \) was a host, but we can learn more...
  – MUST include Host Identity
  – Arrival Interface ID
  – Departure Interface ID
  – Arrival Timestamp
  – Round-trip Delay Measurements
Route Ensemble (not showing Src=$h(0,j)$)

Route Ensemble = {
    \{h(1,1), h(2,1), h(3,1), \ldots h(N1,1)=Dst\},
    \{h(1,2), h(2,2), h(3,2), \ldots, h(N2,2)=Dst\},
    \ldots
    \{h(1,m), h(2,m), h(3,m), \ldots h(Nm,m)=Dst\}
}
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
Individual 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