

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!

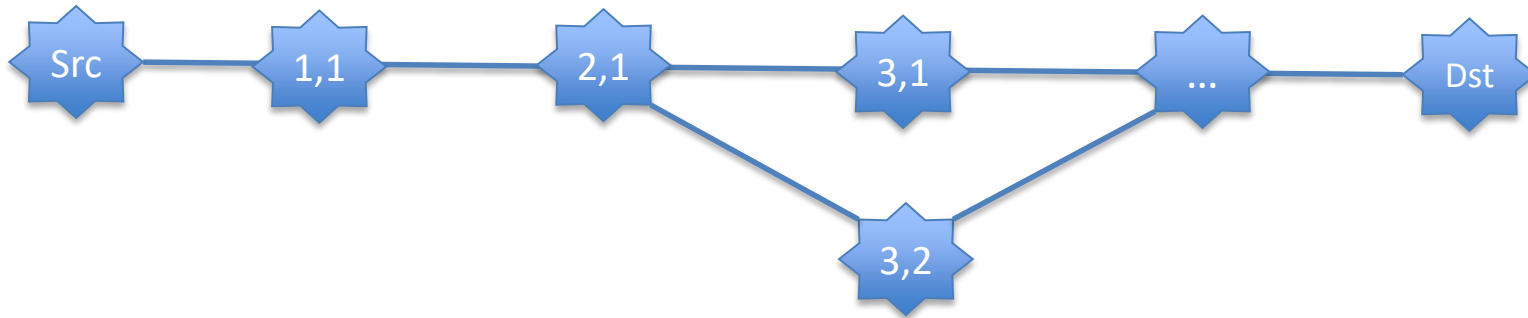
- Each Route represented as an ordered graph:

$Src = h(0,1), h(1,1), h(2,1), h(3,1), \dots, h(N1,1) = Dst$

- $h(i, j)$ 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 $\text{Src}=\text{h}(0, j)$)

```
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}  
}
```



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>