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Mtrace Version 2: Traceroute Facility for IP Multicast

draft-ietf-mboned-mtrace-v2-00

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Changes

- Mtrace ver.2 (mtrace2) now works on UDP
- Both IPv4 and IPv6 have been supported
- Every packet count field has 64 bits length now
 - There are several bugs implying 32 bits length...
- There is no progress from the last TODO list ...
- New IANA issues

Future Changes

- Thanks for various comments after the -00 submission...
- Mtrace2 header
 - Should be protocol-independent with adding an address family field (reserved field will be used)
 - Checksum field can be deleted?
 - UDP checksum only?
 - Should be TLV format ?
 - Due to the discussion in the last PIM WG meeting
 - Would be interesting for the future's flexible function extensions
- Supported protocols
 - IGMP/MLD proxy will be added
- Simple figures will be added

Mtrace2 Header – current

Type	Reserved
Multicast Address	
Source Address	
Destination Address	
Response Address	
Resp TTL	Query ID

IPv4

Type	Reserved
Multicast Address	
Source Address	
Destination Address	
Response Address	
Resp Hop Limit	Query ID

IPv6

Mtrace2 Response Data

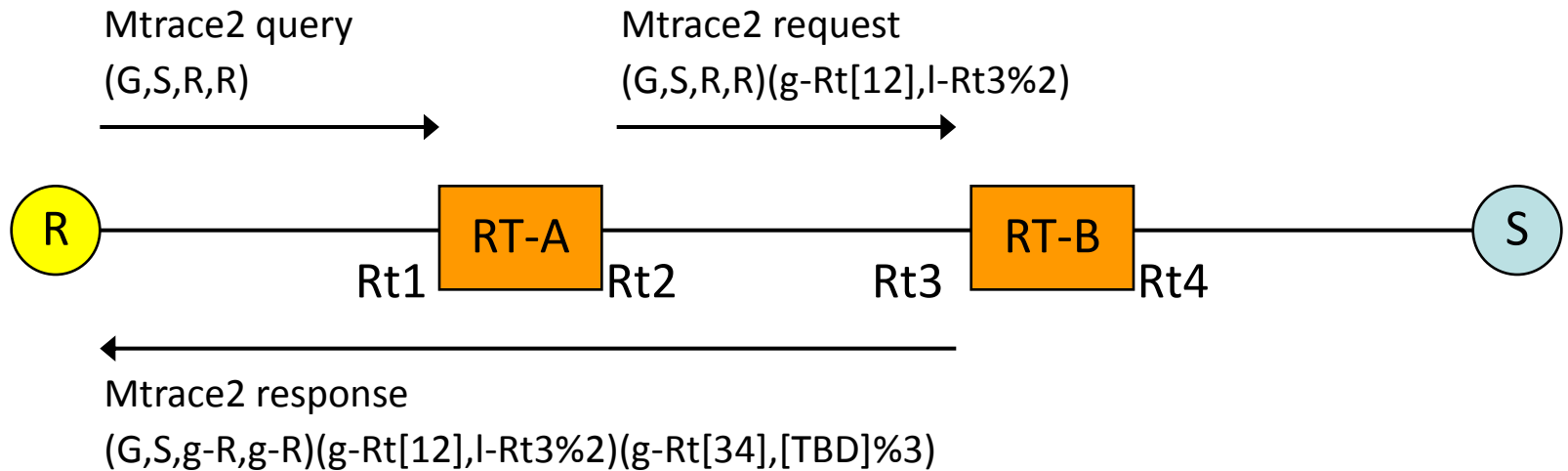
Query Arrival Time						
Incoming Interface Address						
Outgoing Interface Address						
Previous-Hop Router Address						
Input packet count on incoming interface						
Output packet count on incoming interface						
Total number of packets for this source-group pair						
Rtg Protocol	Fwd TTL	M	B	S	Src Mask	Forwarding Code
		Z				

IPv4

Query Arrival Time				
Incoming Interface ID				
Outgoing Interface ID				
Local Address (128 bits)				
Remote Address				
Input packet count on incoming interface (64 bits)				
Output packet count on incoming interface				
Total number of packets for this source-group pair				
Rtg Protocol	Fwd Hop Limit	MBZ	S	Src Prefix Len
Forwarding Code	Reserved			

IPv6

Inserted Addresses



Mtrace2 Response: IIF/OIF

- Local Address
 - IPv4
 - Incoming/Outgoing Interface addresses
 - IPv6
 - Local address
 - Local address: Global IPv6 address
 - » Uniquely identifies the router
 - TODO: If no global address, link-local address can be filled in? Or global address is MUST?

Mtrace2 Response: Remote Addr.

- Previous-Hop Router / Remote Address
 - IPv4
 - Address of Previous-Hop Router
 - IPv6
 - Address of Previous-Hop Router
 - Interface IDs + Remote address
 - Interface ID: InterfaceIndex of IF-MIB
 - Link-local unicast address is MAY, and global address is SHOULD?
 - TODO: If no global address?

Counting the Number of Receivers

- Many research proposals for counting the number of receivers
 - Counting technique
 - Router-based (e.g. our paper)
 - Direct counting (e.g. RTCP [RFC3550])
 - Fethi Filali, Hitoshi Asaeda, and Walid Dabbous, "Counting the Number of Members in Multicast Communication", Proc. ACM NGC 2002, pp.63-70, October 2002, Boston, USA.
 - Estimation technique
 - IVS etc.

Membership Calculation

Router or server support Approach

- Pros:
 - Support for summarizing report
 - Low latency and accurate results
- Cons:
 - High implementation cost

Counting technique

End-to-End Approach

- Pros:
 - No network processing feedback
 - Support SSM model well
- Cons:
 - Trade-off between Accuracy vs. Latency

Estimation technique

RTP/RTCP

Filali-Asaeda-Dabbous

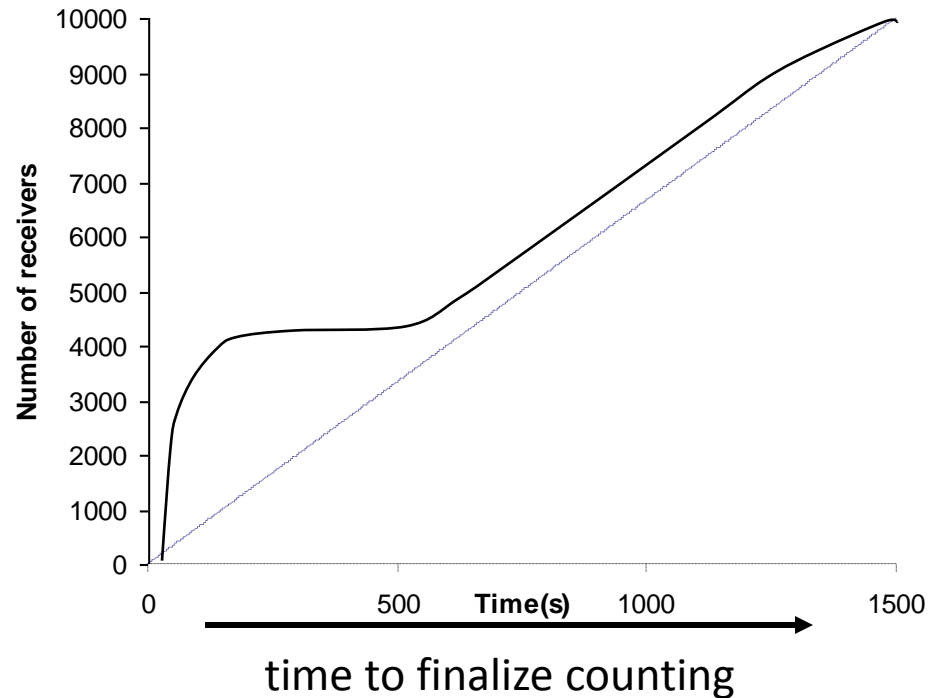
IVS

RFC 3550 – RTP/RTCP

- Collecting all reports by **scheduling feedback** transmission
- **Scales linearly** with the number of members
 - 128Kbps stream has 10000 receivers
 - Suppose 90 bytes the RTCP packets rate were received:

$$\frac{75\% * (5\% * \text{session_bw})}{90\text{bytes}} = 6,667 \text{ packets/s}$$

$$\begin{aligned} \text{Interval} &= \frac{\text{receivers} * \text{avg_rtcp_size}}{75\% * (5\% * \text{session_bw})} \\ &= \frac{10000 * 90}{600} = 1500\text{s} \end{aligned}$$



Considerations

- There are various ways to calculate the number of receivers
- Each has Pros. and Cons.
- Privacy?
 - Contents providers may NOT want to disclose the number of receivers of their contents

IANA Issues

- Request to reserve mtrace2 UDP port number
- Request to use Router Alert Option
- TLV (if used)
- IANA has assigned 224.0.1.32, mtrace.mcast.net, as the default multicast address for IPv4 mtrace responses
 - Mtrace2 uses the same IPv4 address as the default multicast group for IPv4 mtrace responses
 - Request to assign MTRACE2_IPV6RESPADDR for IPv6 mtrace2 responses, if multicast responses are still needed

Next Step

- Revise the draft
 - Thanks for all comments sent to the ML and authors
 - We appreciate more reviews
 - Fix TODOs, open issues, and several bugs, and present the new draft at the next IETF