Extending ICMP for IP-related Information Validation

draft-liu-6man-icmp-verification

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Backgroud and Motivation

IPv6 addresses, especially SRv6 SIDs, can be related with more and more extra information :

- VPN/EVPN Services
- SRv6 Endpoint Behaviors
- Flex Algorithms
- Service Functions

MPLS LSP Ping: new info related -->new FEC sub-TLV defined

This draft defines new ICMPv6 messages to verify the data plane against the control plane in IPv6 networks.

New ICMPv6 Messages



ICMPv6 Validation Reply

0 2 3 0123 789012345678901234 5 8 9 0 1 Code Checksum Type +++++ Identifier Sequence Number Reserved -+-+-+-+-+-+-+-+-+

Code:

(0) Validation passed

(2) One or more of the objects were not understood

(1) Malformed request received(3) Information mismatch

Validation Information Object



a New ICMP Extension Object

- Class-Num: TBA, indicates the Validation Information Object
- C-Type: indicates the type of the information that needs to be verified
- Object payload: C-Type-specific data

C-Type	Object Payload
1	Endpoint Behavior
2	IPv6 Prefix IGP Algorithm
3	SRv6 IGP-Adjacency Segment
4	VPN IPv4 Prefix
5	VPN IPv6 Prefix
	1

Object Payload-1

SRv6 Endpoint Behavior

0 1 2 3 4 5 6 7 8 9 0 1 2

IPv6 Prefix IGP Algorithm

0 2 3 8 g 0 3 5 6 7 8 g Q +-+-+-+-+-+ Algorithm Protocol Reserved

applicable for both SRv6[RFC9350] and regular IPv6 prefix [I-D.ietf-lsr-ip-flexalgo]

Object Payload-2

SRv6 IGP-Adjacency

0 7890123456789012345 0123456 78901 -+-+-+-+-+ -+-+-+-+-+ Protocol Algorithm Adj. Type Reserved -+-+-+-+-+-+-+ Local Interface ID (4 or 16 octets) Remote Interface ID (4 or 16 octets) Advertising Node Identifier (4 or 6 octets) n. Receiving Node Identifier (4 or 6 octets)

Object Payload-3

VPN IPv4 Prefix

0 1 2 3 0 1234567890 1234567890 23 5 8 Route Distinguisher (8 octets) -+-+-+-+-+-+-+-+-+ IPv4 prefix +-+-+-+-+-+-+-+ -+-+-+-+ Prefix Length Must Be Zero

VPN IPv6 Prefix

0 2 1 3 012345 6 7890123456789012345678901 -+-+-+ Route Distinguisher (8 octets) IPv6 prefix Prefix Length Must Be Zero

Main Processing Procedures

Sending a Validation Request

- Validation Information object(s)
- Target IP: IP address/SRv6 SID to be verified, set as the destination address of the IP header field(without SRH), or set as the last segment(with SRH)

Receiving a Validation Request

- DA is locally configured as a segment or local interface (SL=0)
- verify the information encoded in the Validation Information Object

Sending a Validation Reply

- set the return code based on the verification result
- IP routed

Receiving a Validation Reply

match the reply with the request using the Identifier and Sequence Number

Next Steps

• Request feedback and comments

Thank You !