OAM Deployment Consideration

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Overview

Fundamentals

- SRv6 Ping verifies network connectivity and host reachability by sending ICMP requests and waiting for replies.
- SRv6 Traceroute probes the path hop-by-hop by incrementing the Hop Limit value, constructing the path topology and locating faulty nodes.

Targets

- SID and Locator Reachability: Validates the forwarding state of individual SIDs or entire Locator prefixes
- Segment List and Policy Validation: Ensures the integrity of service links through explicit path detection

Implications

Initiation Points

- CE Devices: Support only end-to-end service reachability verification, unable to perceive internal paths within the carrier network.
- PE Devices: Support both service-layer detection (simulating CE perspective) and tunnel-layer detection (validating paths with complete SRH lists).
- P Devices: Must support SRH parsing, ICMPv6 error message generation, and decoding capability for compressed SIDs.

Detection Granularity

- Hop-by-Hop Detection: Enables fine-grained fault localization, suitable for troubleshooting intermittent packet loss segment by segment.
- End-to-End Detection: Verifies only connectivity between source and destination nodes, without concern for intermediate node states

Paths

- SRv6 OAM must simultaneously support both Best-Effort (BE) and Traffic-Engineered (TE) paths.
- When an SRv6 Policy contains multiple Segment-List paths, parallel testing should be supported by distinguishing paths using different Flow Labels or DSCP markings

Key Technical Considerations

Encapsulation Mode Selection

- Encap (Encapsulation) Mode: Suitable for end-to-end path verification, ensuring intermediate nodes process according to the specified SID list
- Insert (Insertion) Mode: Ideal for dynamic path adjustment scenarios, such as inserting additional SIDs in service chains.
- Compressed Mode (e.g., uSID): Reduces SRH overhead through formats like uSID, improving transmission efficiency

Handling Asymmetric Paths

- The inconsistency between forward and reverse paths, caused by asymmetric routing.

Path MTU Discovery

- Support dynamic discovery of Path MTU via SRv6 OAM. The source node initiates the probe and collects the effective MTU of the path.

BSID Stitching

- When an SRv6 TE Policy includes another policy's BSID, ICMPv6 Time Exceeded messages fail to reach the original headend.
- Simplified technical phrasing while preserving accuracy
- Used "headend" consistently
- Kept critical terms: BSID, ICMPv6, proxy-forward

Advanced Scenarios

OAM for SRv6-based EVPN

- Support EVPN Ping over SRv6. Select the encapsulation format based on path characteristics:
- Nested SRv6 (L3-in-L3): [Ethernet][IPv6(Outer)][SRH][IPv6(Inner)][UDP][MPLS Ping Payload]
- L2-over-SRv6: [Ethernet(Outer)][IPv6][SRH][Ethernet(Inner)][IPv6][UDP][MPLS Ping]

OAM for Network Slicing

- Provide independent OAM assurance for different service slices.
- When a slice SID path fails, it should trigger a fast switchover of the corresponding slice path without affecting other slices.

Next Steps

- Welcome questions and comments