Clarifying SRv6 SID List Processing

draft-farrel-6man-sidlist-clarification

Presenter: Adrian Farrel adrian@olddog.co.uk

Co-author: Suresh Krishnan

IETF-122 : Bangkok, Thailand : March 2025

The Issue

- SRv6 processing is defined as copying an entry from the SRH SID List to the IPv6 Destination Address field
  - Thus, entries in the SID List are asserted to be IPv6 addresses
- SID List compression (draft-ietf-spring-srv6-srh-compression) has a variation
  - The SID List entry for a REPLACE-CSID is not an IPv6 address
  - The REPLACE-CSID is operated on by a function to generate the next DA
- The ADs spotted this discrepancy during IESG evaluation
  - They asked that draft-ietf-spring-srv6-srh-compression Update RFC 8754
    - The text mentions REPLACE-CSID as a specific exception
  - They suggested that a clarification of SRv6 processing is needed

Background (1 of 4)

- RFC 8402 defines the Segment Routing architecture
  - Came out of SPRING
  - Defines the concepts, but not the encoding
  - Makes some specific statements about lists of SIDs and DAs
  - An ordered list of segments is encoded as an ordered list of IPv6 addresses in the routing header.
  - An SR Policy is instantiated as an ordered list of SRv6 SIDs in the routing header.
  - In SRv6, NEXT is implemented as the copy of the next segment from the SRH to the destination address of the IPv6 header.

Background (2 of 4)

- RFC 8754 defines the SRH
  - Came out of 6man
  - Specifies the encoding and processing rules
  - Makes some statements about SID List and DAs
  - `Segment List[0..n]:  128-bit IPv6 addresses representing the nth segment in the Segment List.`
  - `S16.  Copy Segment List[Segments Left] from the SRH to the destination address of the IPv6 header.`

Background (3 of 4)

- RFC 8986 defines SRv6 Network Programming
  - Came out of SPRING
  - SIDs in SID List entries contain
    - LOCATOR
    - FUNC
    - ARG
  - The resulting 128 bits might or might not be strictly an IPv6 address (let's not go there!), but:
    - It is "routable" so can be placed in the DA and the packet will be forwarded
    - It is still copied as a unit from the SID List to the DA

Background (4 of 4)

- draft-ietf-spring-srv6-srh-compression shows SID List compression
  - Currently on RFC Editor Queue
  - One approach is to use the REPLACE-CSID
    - The SID List entries are not always IPv6 addresses
    - The DA is achieved by performing a function on the SID List entries
- The ADs noticed that this modifies the text in RFC 8754
  - Thus, the draft flags an “update”
  - The text says:
  - `This document updates RFC 8754 by allowing a Segment List entry in the Segment Routing Header (SRH) to be either an IPv6 address, as specified in RFC 8754, or a REPLACE-CSID container in packed format, as specified in this document.`

This draft

- The aim is to make a clarification
  - SID Lists do not have to contain IPv6 addresses
  - The DA is derived by applying a function to the SID List entries
    - That function may be a direct copy
    - The function could be more complex as with REPLACE-CSID
    - No limit to the function provided it is clearly known from the definition of the SID Type
    - Note new I-D draft-du-spring-srv6-function-encryption proposes encrypting the FUNC/ARG
- The aim is NOT TO CHANGE the SRv6 architecture
- There is NO CHANGE to the SRH encoding
- This enables future use cases without each having to make a specific update to 8754
  - If this draft had already existed, draft-ietf-spring-srv6-srh-compression might have sailed through IESG evaluation

Questions for the Room

1. Do we need this draft at all?
   - draft-ietf-spring-srv6-srh-compression is approved and “updates” RFC 8754
   - The ADs thought a draft like this would help
   - This document generalises the case beyond REPLACE-CSID
2. Should this draft also “update” RFC 8754?
   - Currently it is positioned as a “clarification”
   - As a generalisation it is probably an “update”
   - Would need to move to Standards Track
   - Would need to include specific text to state the “update”
3. Should it also “update” RFC 8402?
   - 8402 is not specific about the SRH encoding, but see previous quotes
4. Does this belong in 6man?
   - RFC 8402 came out of SPRING
   - RFC 8754 came out of 6man
   - SPRING “owns” SRv6

Actions for the Authors

- Revise draft with more specific/clear indication of the update
- Set “updates” flags as necessary
- Change track as necessary
- Direct to correct WG and cross-post