IETF 110

draft-src-compdt-spring-compression-analysis

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Presenter and Chair:
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The design team is to produce (rough) consensus (of the DT) outputs to the WG on two related topics:

1) What are the requirements for solutions to compressing segment routing information for use over IPv6;
   
   On-Going -05 version

2) An analysis of proposed approaches to compressing segment routing information for use over IPv6.
   
   On-Going -00 version
Introduction

An analysis of each mechanism against the requirements.

“The following mechanisms are proposed to compress the SRv6 SID list.”

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Draft Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSID</td>
<td>Draft-filsfilscheng-spring-srv6-srh-comp-sl-enc</td>
<td>Describes two new SRv6 SIDs, a combination of SIDs from [draft-filsfils-spring-net-pgm-extension-srv6-usid] and [draft-cl-spring-generalized-srv6-for-cmpr]</td>
</tr>
<tr>
<td>CRH</td>
<td>Draft-bonica-6man-comp-rtg-hdr</td>
<td>Requires two new routing header types and a label mapping technique</td>
</tr>
<tr>
<td>VSID</td>
<td>Draft-decrane-spring-srv6-vlsid</td>
<td>Defines a set of SID behaviors to access smaller SIDs within the SR header</td>
</tr>
<tr>
<td>UID</td>
<td>Draft-mirsky-6man-unified-id-sr</td>
<td>Extends the SRH to carry MPLS labels or IPv4 addresses</td>
</tr>
</tbody>
</table>
CSID

A compressed SRv6 Segment List Encoding in the SRH.
- Does not require any SRH data plane change.
- Does not require any SRv6 control plane change.
- Leverages the SRv6 Network Programming model.

Define two new SID flavors:
- NEXT-C-SID
- REPLACE-C-SID

Merges SID behaviors from uSID (draft-filsfils-spring-net-pgm-extension-srv6-usid) and GSID (draft-cl-spring-generalized-srv6-for-cmpr)
CRH

Two new IPv6 Routing Headers (CRH-16 and CRH-32)
- Next Header, ExtHdr Len, Routing Type, Segments Left
- SID List (16 or 32-bit SIDs)

Each SID maps to a CRH-FIB entry
- IPv6 address or SRv6 SID
- Topological function plus optional arguments
- Service function plus optional arguments
- Flags

No change to IPv6 forwarding plane or addressing model

Minimal change to SRv6 control plane
vSID

Generalize the SRH for any size of SIDs (<= 128 bits)
- 128-bit SIDs becomes a specific case
- Does not require any SRv6 control plane change.
- Leverages the SRv6 Network Programming model.

Defines one new SID flavor.

Builds on a common SRv6 locator prefix:
- SID ::= prefix + vSID
- Encodes only the vSID in the SRH. Not the redundant prefix.
- Everything else uses the regular 128-bits SID
UID

A compressed SRv6 Segment List Encoding in the SRH (suggested) or other type of Routing Header.

- Introduce UET Flags to unify traditional SRv6 SID and U-SID forwarding behaviors, no compatibility issues.
  - 00: classical 128-bits IPv6 address
  - 01: 32-bits truncated piece of IPv6 address
  - 10: 32-bits index (MPLS label suggested)
  - 11: 16-bits truncated piece of IPv6 address

- Support MAPPING and STICHING mode, The former is used for disorderly IP address planning scenarios, while the latter is used for scenarios with common prefix.

- For MAPPING mode, index to IPv6 address mapping need to be advertised, MPLS prefix-SID can be reused; for STICHING mode, UET-32/16/etc flavors need to be advertised with the endpoint behavior of SRv6 SID, little changes.

- Leverages the SRv6 Network Programming model with new flavors.
SRv6 Compression Scenarios

An SR domain consisting of 3 sub-domains is shown to illustrate the scenarios associated with encapsulation header size, forwarding efficiency and state efficiency.
Analysis Completion Plan

What we’ve done:

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb 3</td>
<td>Analysis template (introduction, template format) proposed to srcomp@ietf</td>
</tr>
<tr>
<td>Feb 11</td>
<td>First analysis text proposed to srcomp@ietf</td>
</tr>
<tr>
<td>Feb 12</td>
<td>Decided to analyze 4 proposals (CSID, CRH, VSID, UID)</td>
</tr>
<tr>
<td>Feb 17</td>
<td>Team reviewed draft text, decided to complete requirements firstly</td>
</tr>
<tr>
<td>March 6</td>
<td>Requirements completed, revision 05 submitted, the key input for analysis</td>
</tr>
</tbody>
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Rough plan:

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
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<tbody>
<tr>
<td>Mid April</td>
<td>Complete remaining analysis text proposal for DT review</td>
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<tr>
<td>Late May</td>
<td>Review and submit a new revision for SPRING review</td>
</tr>
</tbody>
</table>
Comments & Questions?