Subnetwork Encapsulation and Adaptation Layer (SEAL)

IETF 71 MANET Working Group

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Problem Statement

• MANETs connect sites across routing regions containing heterogeneous links
• Encapsulation MANET routers are neighbors in virtual topology, but with multiple IP- and/or sub-IP layer hops between
• Virtual topology resembles a “subnetwork” (i.e., a “virtual ethernet”), manifested through tunneling
• This presents issues for MTU determination and duplicate packet detection
Approach

- Generic, lightweight mid-layer encapsulation
- New IP protocol, or embedded sublayer
- Augments *any* IP tunnel mechanism

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<tr>
<th>0</th>
<th>1</th>
<th>2</th>
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<tbody>
<tr>
<td>Payload</td>
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<tr>
<td>SEAL Header (4 Bytes)</td>
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<td>Inner Headers (IP, IP/ESP, etc.)</td>
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<tr>
<td>Outer Headers (IP, UDP/IP, etc.)</td>
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<td>ICV (2 Bytes)</td>
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ID Extension (16 bits)
M - more segments
C - congestion experienced
I - integrity check vector included
CTL - '00' (non-probe), '01' (FRAGREP), '1x' (probe)
Seg# - segment number from 0 to 7
Next Header (8) - same as IP protocol/next header
Duplicate Packet Detection

“Haven’t I seen this one already?”

SEAL 32-bit ID used for Duplicate Packet Detection

- For initial IP fragments with ipproto=SEAL, (src, dst, ID32) gives robust duplicate detection
- For non-initial IP fragments with ipproto=SEAL, (src, dst, ID16) gives sufficient duplicate detection because:
  - SEAL ratchets segment size to squelch IP fragmentation
  - Persistent IP fragmentation will only occur on links with tiny MTUs (256 or below), and this ONLY happens on slow links