Subnetwork Encapsulation and Adaptation Layer (SEAL)

IETF 71 MANET Working Group

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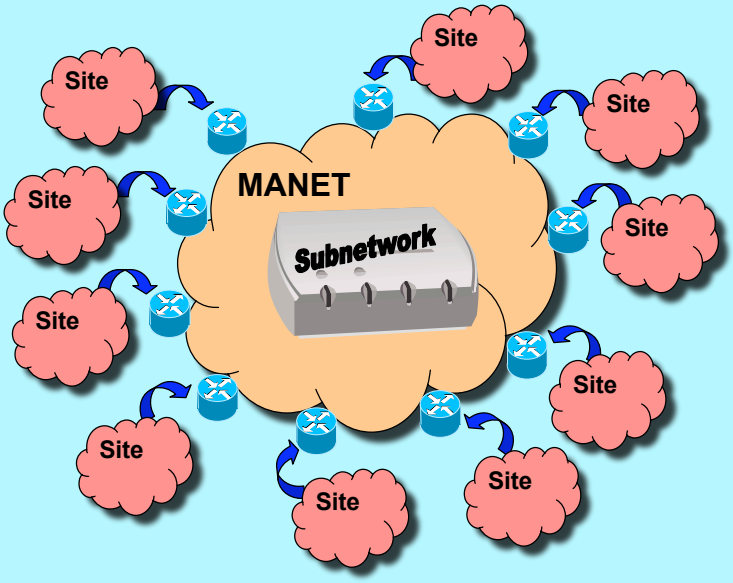
Problem Statement

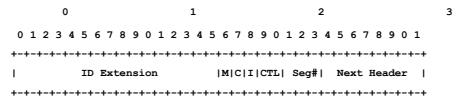
- MANETs connect sites across routing regions containing heterogeneous links
- Encapsulation MANET routers are neighbors in virtual topology , but with multiple IP- and/or sub-IP layer hops between
- Virtual topology resembles a “subnetwork” (i.e, a “virtual ethernet”), manifested through tunneling
-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

SEAL Subnetwork Model for MANETs

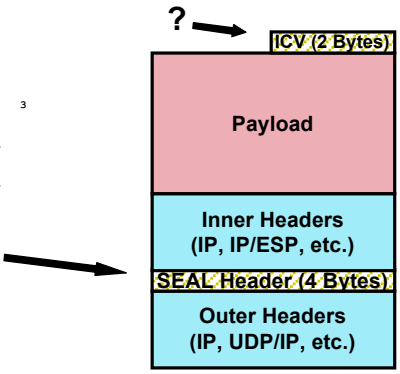


Approach

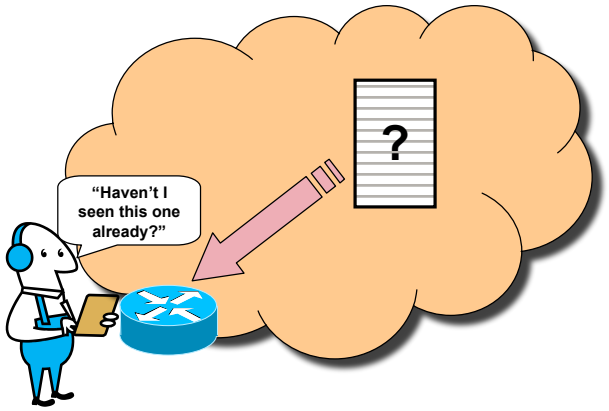
- Generic, lightweight mid-layer encapsulation
- New IP protocol, or embedded sublayer
- Augments *any* IP tunnel mechanism



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



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 fragmentaiton
  - Persistent IP fragmentation will only occur on links with tiny MTUs (256 or below), and this ONLY happens on slow links