SEAL Problem Statement

- **IPv6 minimum MTU is 1280**
- Tunnels **MUST fragment** if path MTU too small (**not permitted** to report MTU < 1280)
- If Packet Too Bigs (PTBs) lost, **black hole**
- Classic tunnel fragmentation requires PTBs; **need proactive fragmentation → SEAL**
- **Applies to all tunnels** (ipip, GRE, IPsec, etc.)

SEAL Strategy

- Admit small and large packets **unfragmented**
- **Proactively fragment mid-sized packets** (non-final fragments **MUST** be at least ~1280)
- At the same time, **send unfragmented probe**
- If probe succeeds**, stop fragmenting**
- Results:
  - First fragment contains **entire IPv6 header chain**
  - **Packets up to 1500 delivered** even if PTBs lost
  - Larger packets delivered if path MTU permits
  - **RFC4821 for tunnels**

SEAL Requirements

- **Uses IPv6 Fragment Header - codes Reserved fields** (adds version; control bits)
- **Updates RFC2460** (if approved)
  - Draft: https://datatracker.ietf.org/doc/draft-templin-intarea-seal/
  - Implementation: http://linkupnetworks.com/seal/sealv2-0.2.tgz
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