# Making IPv6 options an option

draft-herbert-ipv6-update-opts-00
draft-herbert-6man-icmp-limits-03

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# Problem

*IPv6 options not considered viable in Internet*

- Clarifications needed
- No “useful” options defined
- Processing overhead (TLVs)
- Extension header drops (RFC7872)
- Long option lists (DOS vectors)
- Hop-by-Hop options RFC2460 requirements

# Proposed options

- draft-leddy-6man-truncate
- draft-hinden-6man-mtu-options
- IOAM
- Firewall And Service Tickets

# RFC8200 and Hop-by-Hop options

“NOTE: While [RFC2460] required that all nodes must examine and process the Hop-by-Hop Options header, it is now expected that nodes along a packet's delivery path only examine and process the Hop-by-Hop Options header if explicitly configured to do so.”

Question: Does “along the delivery path” include the final destination?

# Clarify adding, removing, changing

- Option Type and Option Length cannot change en route (auth hdr relies on this)
- Options cannot be inserted or removed en route
- Above includes inserting or deleting an HBH or Dest Opts EH
- When routing header present “final destination” is last destination in header

# Changeable destination options

- DestOpts precedes routing header
  - Visited nodes may change Option Data
  - Nodes identify Dest Opts before RH by looking at Next Header
- DestOpts after/without routing header
  - Option cannot be changed en route
  - Still must zero Data for Auth header

# DestOpts processing requirements

- DestOpts precedes routing header
  - MAY be examined or processed by intermediate destinations
  - Align with HBH in RFC8200
- DestOpts after/without routing header
  - MUST process

# Extension header limits

- RFC6434-bis
- May limit consecutive PAD options to 7
- May disallow unknown options
- May have limit on maximum # non-pad opts
- May limit length of HBH or DestOpts EH

# ICMPv6 errors for processing limits

- Parameter problem (type 4)
  - Intermediate nodes send Unrecog header
  - Extension header too big
  - Extension header chain too long
  - Too many options in extension header
- Destination unreachable (type 1)
  - Headers too long
  - Multi-part ICMP

# Router implementation

- Unprogrammable legacy not easy
- Limits aid HW or SW implementation
- Skip HBH should be straightforward
- Programmable devices (P4 or BFP)
  - No loops
  - Unroll path to allow maybe eight options

Thank you!