UDP Options

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-14 updates from interim 9/3/21

- OCS option changed to fixed location at first 4-byte boundary
  - No longer using TLV; contents are zero if not used, zero-fill before if not aligned

- UNSAFE option
  - Simpler format of reserved block of 32 KIND values rather than cascaded single kind/unsafe kind
  - Used for options that are "critical and elective" (can't be ignored when they appear)
  - Update draft to make it clear that zero length data is OK
  - Treatment of errors
  - Remind that UNSAFE always comes behind FRAG so hidden from legacy

- FRAG option
  - Support required
  - MRSS at least 2x1500 bytes (see next slide)
  - Immediately after OCS, with post-reassembly options after last frag
  - User control of per-frag and per-segment options, but no control over order within each set

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Review of FRAG format

- FRAG is first option after OCS
  - Early location reduces TLV chain for offload
  - Requires field to point to front of frag data

- Each fragment includes includes per-frag opts BEFORE data/segment opts
  - i.e., OCS, FRAG, opt1, opt2, data

- Per-segment opts appear at the end
  - Starts after final data fragment
  - Can continue in zero-data fragments (if per-segment frags are larger than 1 frag)
  - Per-frag/per segment options as per socket settings, CAN be per-packet e.g., using cmsgs

- Reassembles into legacy format
  - i.e., OCS, FRAG, opt1, opt2, data, opt3, opt4
  - Reassembles to "data, OCS/0, opt3, opt4"
  - Same per-segment option proc as unfragmented segment, both pre-frag (xmit) and post-reassy (recv)
  - No limit on segment option length by allowing zero-length frags that consist of only segment options

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UDP Frag and MRSS

- MRSS
  - Defined like TCP MSS, i.e., IP MTU – (fixed IP header + fixed UDP header)
    - Indicates largest UDP payload that can be received, assuming no IP or UDP options
  - Receivers MUST support MRSS of at least 3000 bytes
    - To accommodate 2 1500B IP packet's worth of data
    - Should be 2944 for IPv4 or 2904 for IPv6, but easier to round up to 3000 bytes for both cases

- FRAG
  - Receivers MUST support reassembly of 2 fragments per UDP datagram
    - Receivers capable of larger MRSS or more than 2 frags/datagram
      will indicate that by sending MRSS

  - Each frag size depends on size of per-frag and per-segment options
    - Including IP options, UDP fragment options, and UDP segment options
    - See equations in next slide

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FRAG size calculation

- Definitions:
  - IPovh = IPfixed + IPopts   _IP per packet overhead_
  - UDPsegovh = UDPfixed + UDPsegopts _UDP per segment overhead_
  - UDPfragovh = UDPfixed + UDPfragopts _UDP per fragment UDP overhead_
  - MRSSmax = MRSS – IPovh – UDPsegovh _MRSS max UDP data in 1 segment_
  - perFRAGmax = IPmtu – IPovh – UDPfragovh _max UDP data in 1 fragment_

- Max UDPdata for 2 fragments
  - MIN(MRSSmax, 2 * perFRAGmax - UDPsegopts)

- Number of frags for a given MRSS, once received (allows >2 frags)
  - CEILING(MRSSmax / perFRAGmax)

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Pending issues

- Consensus check on UDP MRSS
  - Proposing 3000 bytes
  - Send up to 2 frags or up to 3000 bytes total, <u>whichever is smaller</u>, until MRSS is received (then up to MRSS total)

- At least one more consistency pass
  - Feedback appreciated