UDP Options

IETF 108 – July 2020

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-09 update (pending)

- Changes
  - FRAG (integrates prev. FRAG+LITE)
  - ACS to CRC32c (from IETF 106)
  - Fix OCS pseudoheader (from IETF 106)

- Additions
  - UNSAFE option
  - Deprecate RFC 6081 as flawed

Summary of option proc. rules

- On option failure -> halt option processing
  - Only options indicating format failure
    - OCS
    - FRAG
  - Zero-len user data received (per fragment) if halt

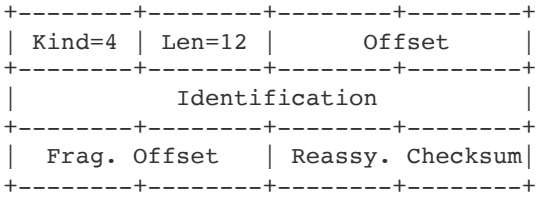
- On option unknown -> halt option processing
  - Only (and all) UNSAFE suboptions
  - User data (if any) received if halt
  - MUST use *before* FRAG to hide user data

New FRAG option

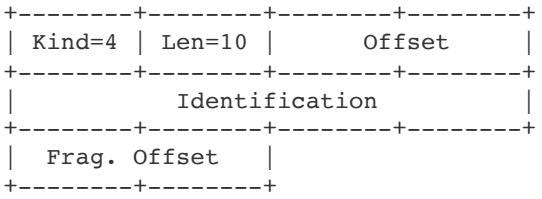
- Used ONLY with zero-len user data
  - I.e., requires equivalent LITE+FRAG behavior
- Allows single fragment packet
  - Enables pre and post-frag options
  - Enables use with UNSAFE to hide user data for unknown options
- Retains “zero-copy” approach
  - Allows reassembly without recopy of bulk of fragment

New FRAG formats

- Terminal:



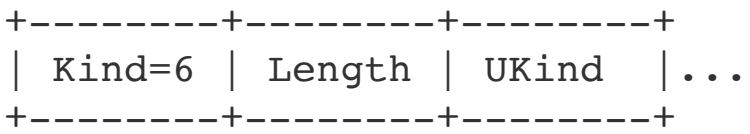
- Non-terminal:



- Fields (combines those of -08 FRAG+LITE)
  - Offset = pointer to front of the fragment (for near-zerocopy) from -08 LITE
  - Identification = from -08 FRAG
  - Frag. Offset = for reassembly from -08 FRAG
  - Reassy. Checksum = (in terminal fragment only) from -08 FRAG
  - Single fragment = terminal format with zero frag offset

New UNSAFE option

- Includes suboption kind (UKind)
  - Prevents implied UNSAFE use of all Kinds
  - MUST implement (means MUST parse to UKind)
- Format



- Length varies
  - Allows 2-byte values when Length == 255
  - As with all options with variable length

“MUST implement” options

MUST

Kind	Length	Meaning
0*	**-**	**End of Options List (EOL)**
1*	**-**	**No operation (NOP)**
2*	**3**	**Option checksum (OCS)**
3*	**6**	**Alternate checksum (ACS)**
4*	**10/12**	**Fragmentation (FRAG)**
5*	**4**	**Maximum segment size (MSS)**
6*	**(varies)**	**Unsafe to ignore (UNSAFE) options**
7	10	Timestamps (TIME)
8	(varies)	Authentication and Encryption (AE)
9	6	Request (REQ)
10	6	Response (RES)
11-126	(varies)	UNASSIGNED (assignable by IANA)
127-253		RESERVED
254	(varies)	RFC 3692-style experiments (EXP)
255		RESERVED

UKinds 0 and 255 RESERVED, others UNASSIGNED (IANA assignable)

Kind and UKind require IESG Approval or Standards Action (except EXP EXIDs)

RFC 6081 issue

- Teredo Extensions (standards track)
  - Fails to update RFC 786 but claims to redefine UDP length in nonsensical ways
  - Fails to address impact on legacy routers
- Propagates an error about UDP length
  - RFC 6081 cites RFC 4830 that claims that RFC 2460 (IPv6) requires UDP length to “be consistent” with IP length
  - RFC2460 and RFC8200 have no such requirement
  - RFC 4830 requires “consistent” but this is undefined
- RFC 6081 introduces a nonsensical extension
  - RFC 6081 defines 4830 consistent as zero surplus (IP payload = UDP payload + 8)
  - Defines 6081 consistent to allow negative surplus areas (IP payload <= UDP payload + 8)
  - Intended to allow IP trailer (but they got it backwards)
  - As defined, requires IP parsing UDP header to know about the IP trailer
  - As defined, cannot traverse legacy IP (not extended per this RFC)
- Our UDP options prohibit this variant
  - Because it would not traverse an IP router unless they parse and validate ALL UDPlen values
  - Thus we should DEPRECATE that RFC
- Kudos to Fred Templin for heads-up