

OMNI IPv6 ND Message Sizing

IETF110 6MAN Working Group - March 9, 2021

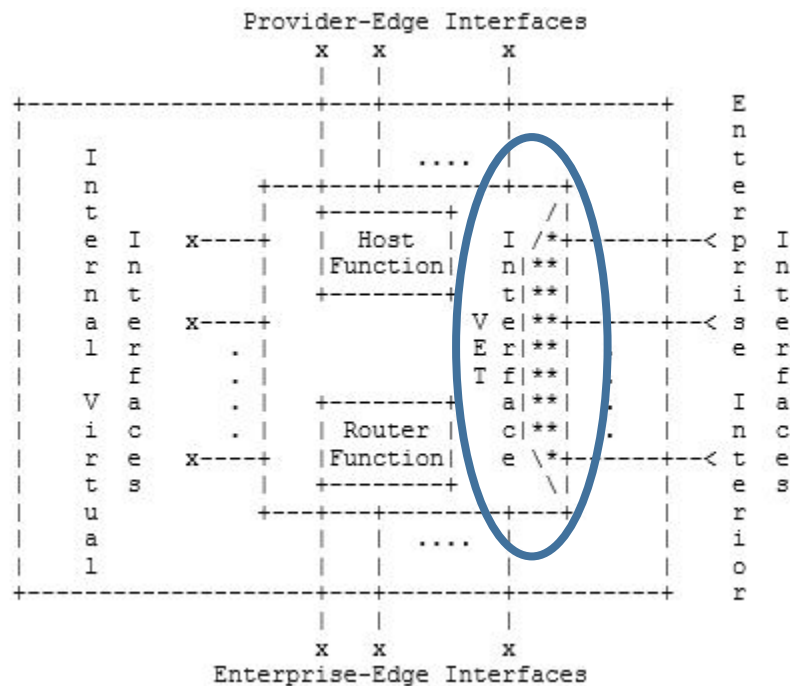
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The Boeing Company

(draft-templin-6man-omni-interface)

Overlay Multilink Network Interface (OMNI)

- draft-templin-6man-omni-interface
- Overlay interface configured over multiple underlying interfaces:



OLD: (from RFC5558, February 2010)

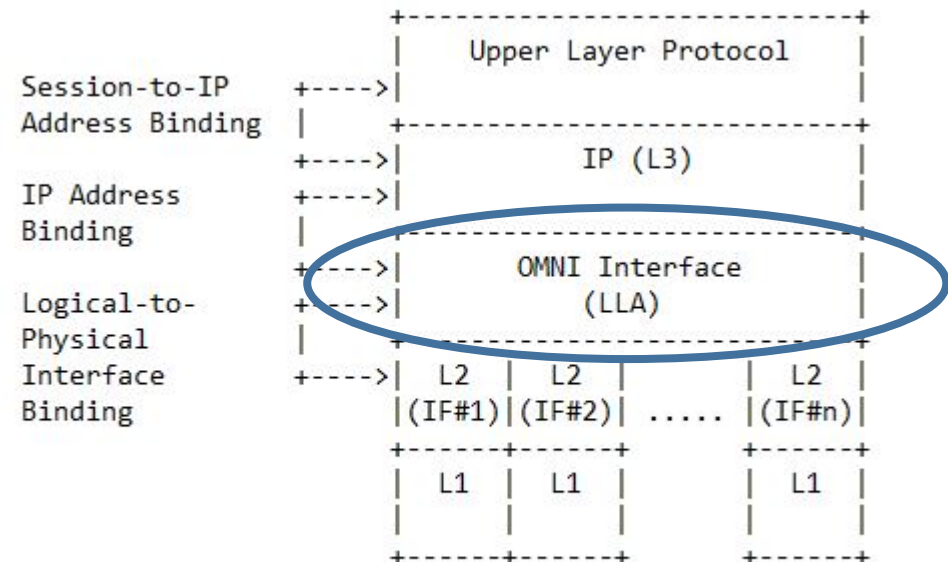
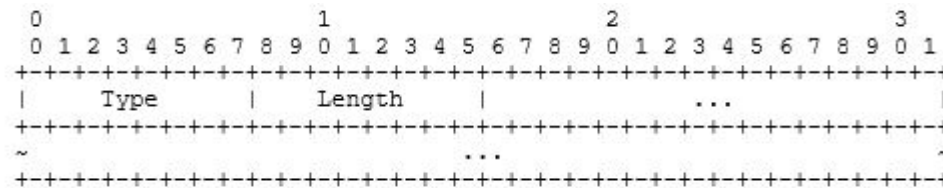


Figure 1: OMNI Interface Architectural Layering Model

NEW: (Copied from RFC7847, May 2016)

OMNI Interface IPv6 ND Messages

- OMNI interfaces use standard IPv6 ND messages (RS/RA/NS/NA) that include OMNI options (briefed at IETF109)
- IPv6 ND message options in TLV format as defined in RFC4861:



Fields:

Type 8-bit identifier of the type of option. The options defined in this document are:

Option Name	Type
Source Link-Layer Address	1
Target Link-Layer Address	2
Prefix Information	3
Redirected Header	4
MTU	5

Length 8-bit unsigned integer. The length of the option (including the type and length fields) in units of 8 octets. The value 0 is invalid. Nodes MUST silently discard an ND packet that contains an option with length zero.

IPv6 ND Message Option Lengths

- Since IPv6 ND message option Length field encodes length of option in 8 octet units, max. IPv6 ND option is $(255 * 8) = 2040$ octets
- OMNI Sub-Options also TLVs, but length expressed in 1 octet units, excluding Type and Length fields
- OMNI Sub-Options may include large objects (e.g., ASCII strings, FQDNs, protocol messages, etc.)
- OMNI Sub-Options may include maximum amount allowed for a single OMNI option
- Draft now fixes sub-option Type field to 5 bits; Length field to 11 bits (instead of former “8 plus 8”)

OMNI Options and Sub-Options

- OMNI option is an IPv6 ND option with one or more “Sub-Options”:

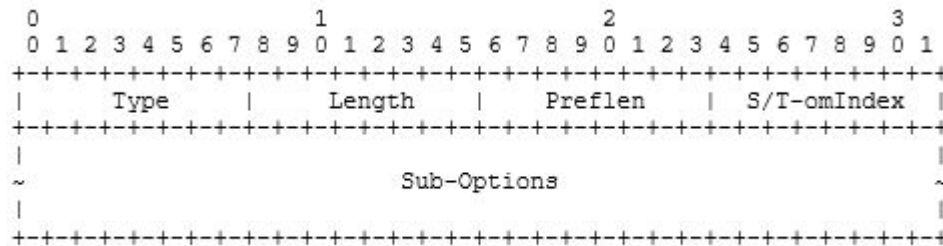


Figure 4: OMNI Option Format

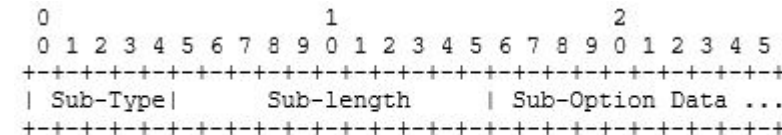


Figure 5: Sub-Option Format

- Sub-Option Types include Pad1, PadN, others (see document for list)
- With 11-bit Sub-Length, each Sub-Option up to $2^{11} = 2048$ octets.
- If Sub-Length would cause OMNI option to exceed its total length, info already processed accepted; final Sub-Option ignored.

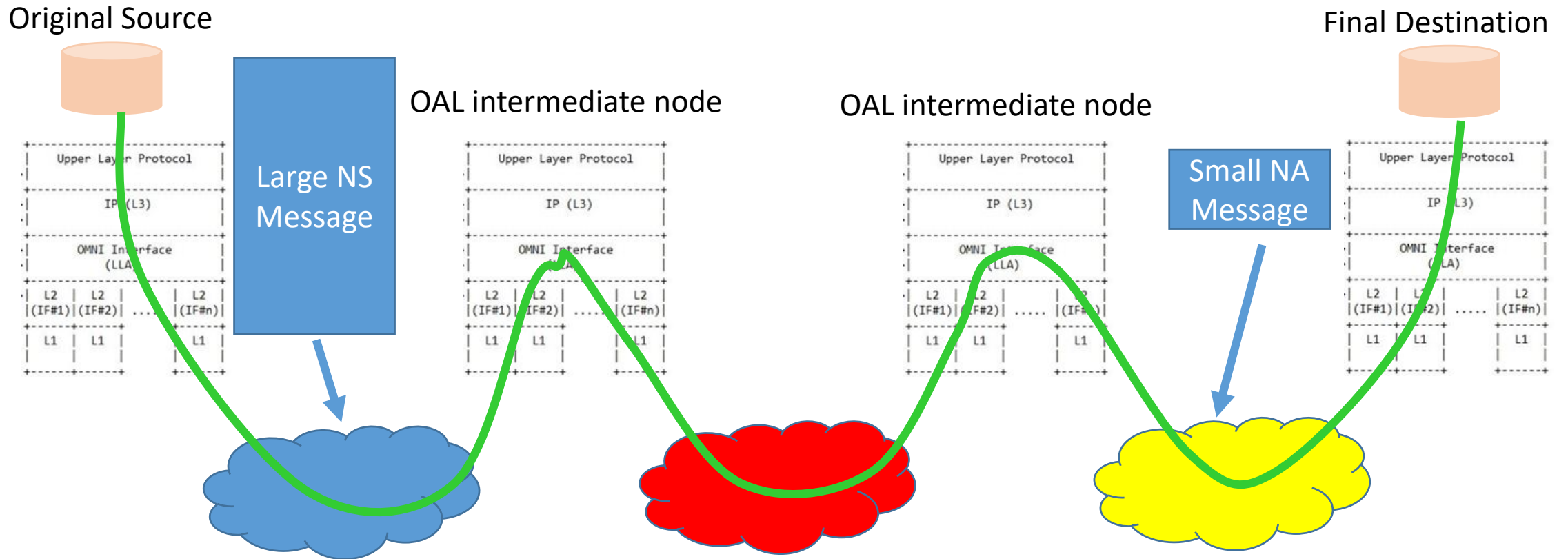
OMNI Options and Sub-Options (2)

- Single IPv6 ND message may include multiple OMNI options. All processed in order of appearance; union of information accepted
- Large object fragmentation across multiple OMNI options not currently supported (to be specified in future, if necessary)
- IPv6 ND messages as large as OMNI interface MTU (9180) permitted; no IPv6 fragmentation permitted (RFC6980)
- Large NS messages useful as OMNI Adaptation Layer (OAL) path MPS probes if small NA replies can be generated

OAL Path MPS Probing

- OAL source crafts large NS probe including OMNI options with large PadN's; sends probe on underlying interface w/o OAL fragmentation
- If OAL destination receives probe, quickly skips over PadN's; returns small NA w/o padding assured to traverse all paths
- Tests one-way path from OAL source to OAL destination across any concatenated underlying networks in path (RFC4821/RFC8899).
- Individual probes expendable; don't interfere with data traffic.
- Single probe success may indicate opportunity to increase path MPS
- Continuous probing needed to detect path MPS changes.

OAL Path MPS Probing (2)



Backups