

Compression Format for IPv6 Datagrams in 6LoWPAN Networks (draft-ietf-6lowpan-hc-04.txt)

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Background

- Improved header compression for:
 - Global Addresses
 - Multicast Addresses
 - Traffic Class and Flow Label
 - Hop Limit
 - UDP Header
 - Arbitrary Next Headers
- Maintain properties of RFC4944 compression
 - Stateless compression for link-local addresses
 - Context-based compression for global addresses

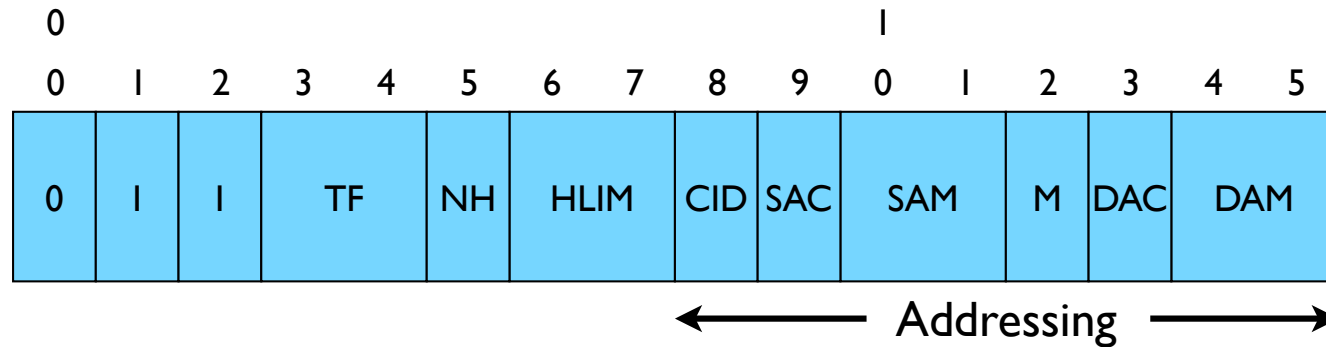
Changes from draft-03

- IP Header Compression
 - More discussion about contexts
 - Context database maps between (prefix, plen) and 4-bit context ID
 - How the context DB is maintained is out-of-scope

Changes from draft-03

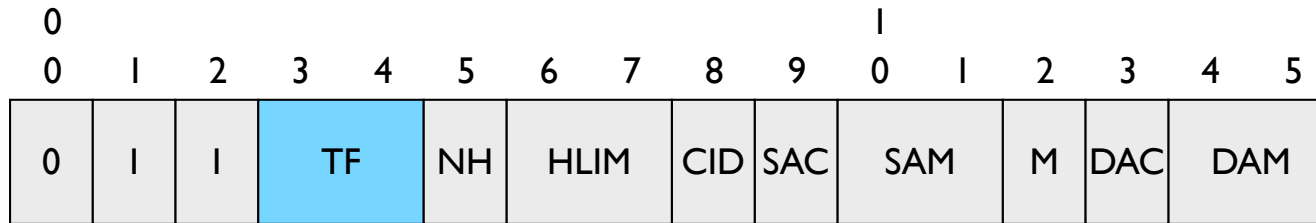
- **UDP Header Compression**
 - More discussion about port and checksum compression
 - 4-bit port range increases port collisions → upper layer integrity check
 - Checksum MAY be elided when:
 - Upper-layer message integrity check is in use
 - Tunneling
 - Endpoint **MUST NOT** elide Checksum unless authorized by source
 - Endpoint **MUST** reconstitute Checksum when expanding

IPv6 Header Compression

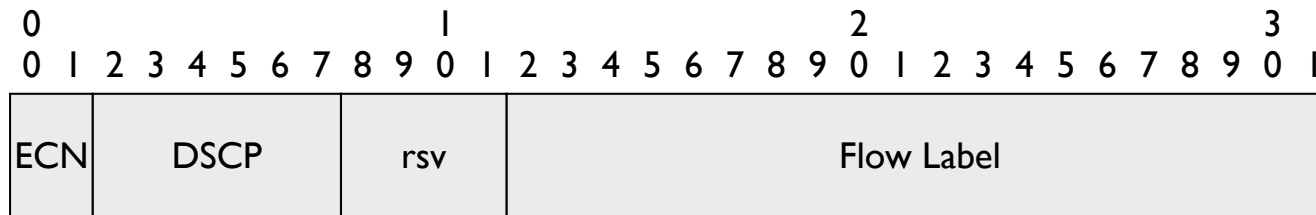


TF	2 bits	Traffic Class and Flow Label
NH	1 bit	Next Header
HLIM	2 bits	Hop Limit
CID	1 bit	Context Identifier Extension
SAC	1 bit	Source Address Context
SAM	2 bits	Source Address Mode
M	1 bit	Multicast Address Compression
DAC	1 bit	Destination Address Context
DAM	2 bits	Destination Address Mode

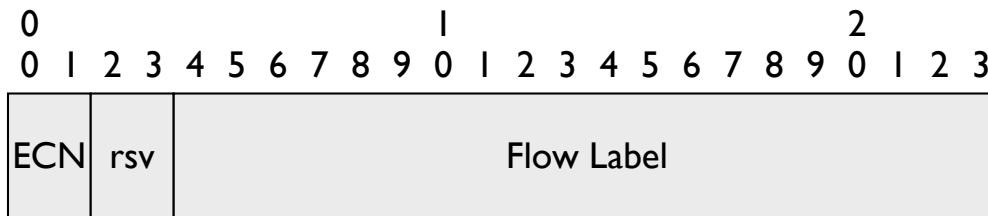
Traffic Class & Flow Label



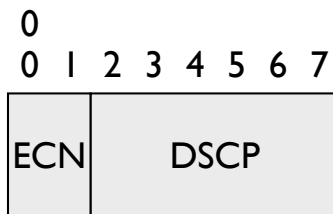
TF = 0



TF = 1



TF = 2



TF = 3

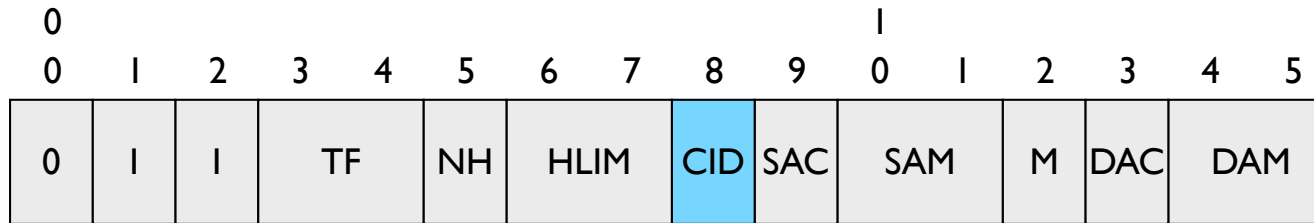
Traffic Class and Flow Label elided.

Hop Limit

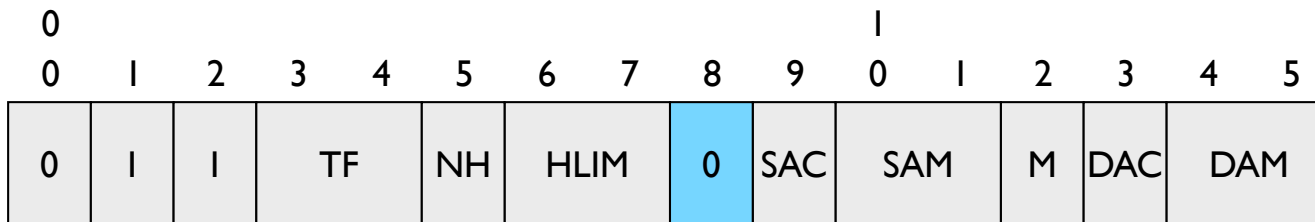
0										1					
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5
0	1	1	TF	NH	HLIM	CID	SAC	SAM	M	DAC	DAM				

0	Hop Limit carried in-line.
1	Hop Limit = 1 and elided.
2	Hop Limit = 64 and elided.
3	Hop Limit = 255 and elided.

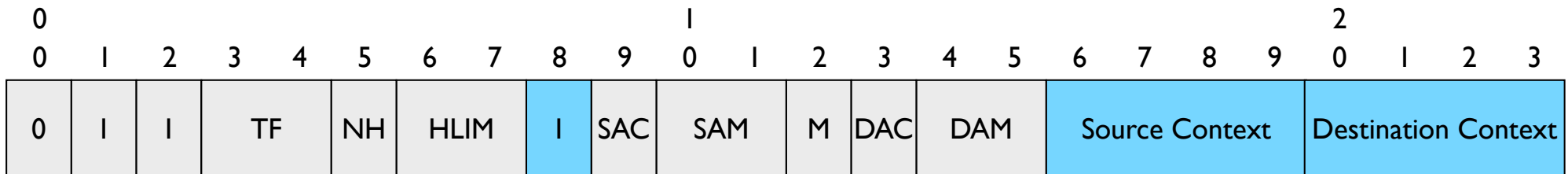
Context Identifier Extension



- CID = 0: Default context

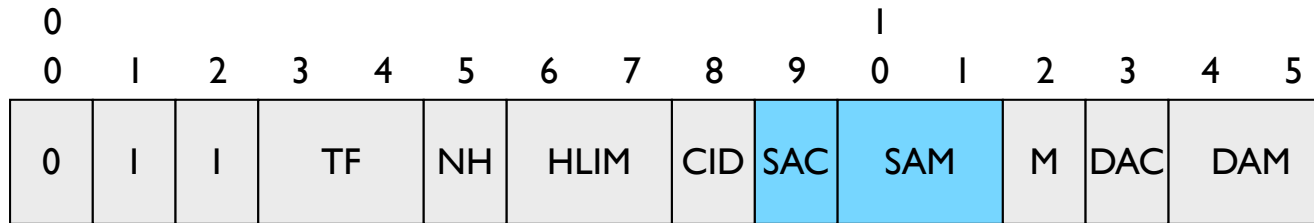


- CID = 1: Context identifier extension


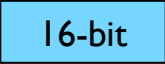


- Number of contexts actually used is out of scope.



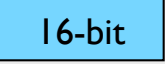
Source Address



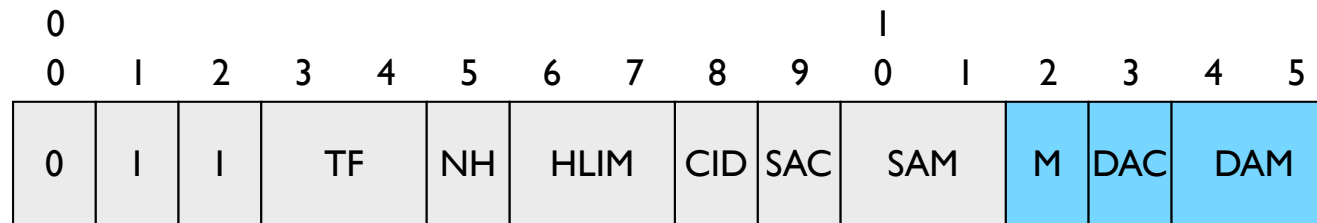
SAC = 0: Stateless compression for link-local communication

- SAM = 0 Completely elided (Unspecified Address)
- SAM = 1  64-bit IID
- SAM = 2  16-bit
- SAM = 3 Completely elided (IID from Lower Layers)

SAC = 1: Context-based compression

- SAM = 0  Full 128-bit Address
- SAM = 1  64-bit IID
- SAM = 2  16-bit
- SAM = 3 Completely elided (IID from Lower Layers)

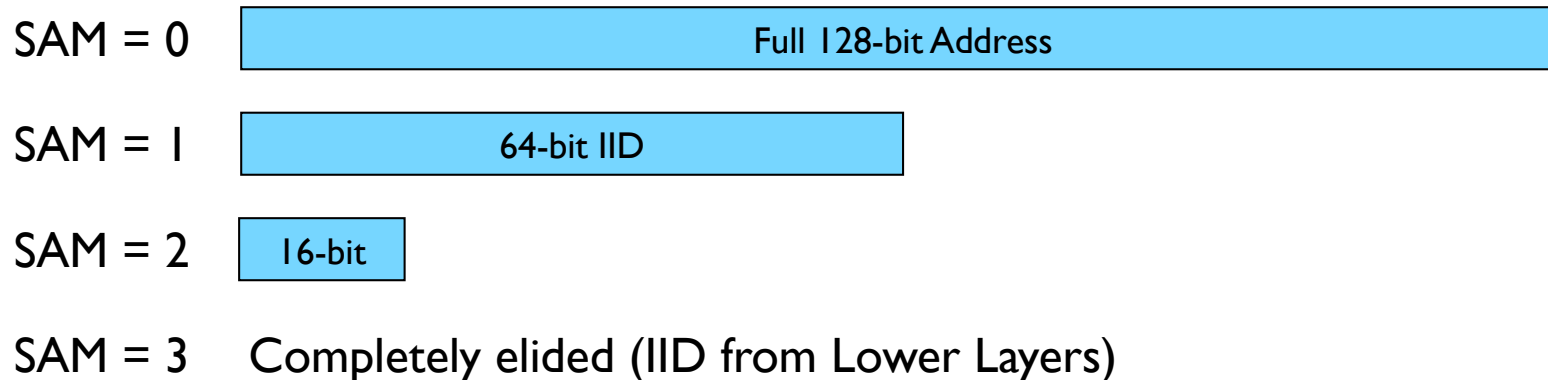
Destination Unicast Address



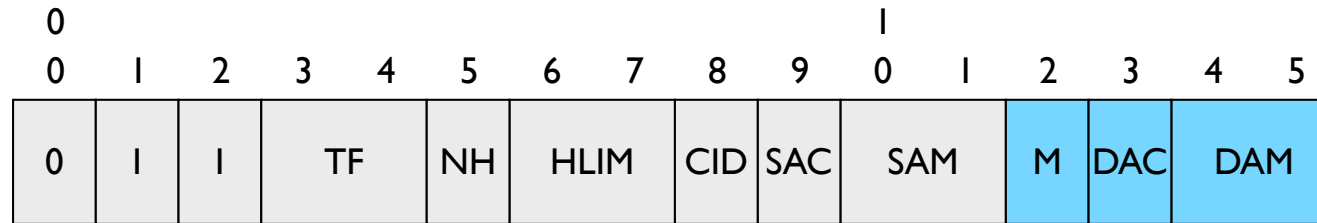
M = 0 (Unicast Address Compression)

DAC = 0: Stateless compression for link-local communication

DAC = 1: Context-based compression



Destination Multicast Address



M = 1 (Multicast Address Compression)

DAC = 0: Stateless compression

SAM = 0

Flags	Scope	Right-Most 40 bits of Group Identifier
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 6 bytes

FFXX::00XX:XXXX:XXXX

Solicited Node and Node Information Queries

SAM = 1

Flags	Scope	Right-Most 24 bits of Group Identifier
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 4 bytes

FFXX::XX:XXXX

Longer well-known addresses (all-dhcp-servers FF05::1:3)

SAM = 2

Scope	Group ID (12 bits)
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 2 bytes (Flags = 0)

FF0X::0XXX

Variable scoped multicast addresses

SAM = 3

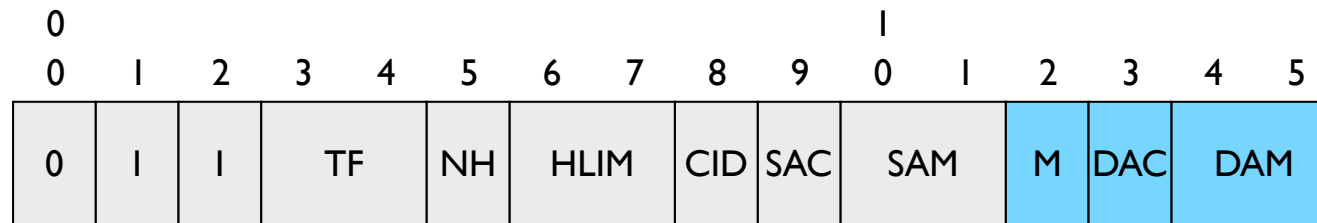
GID (8 bits)

 1 byte (Flags = 0, Scope = 2)

FF02::00XX

Most common link-local cases (link-local all-nodes FF02::1)

Destination Multicast Address



M = 1 (Multicast Address Compression)

DAC = 1: Context-based compression

SAM = 0 Full 128-bit address in-line

SAM = 1

Flags	Scope	RIID	32-bit Group Identifier
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6 bytes

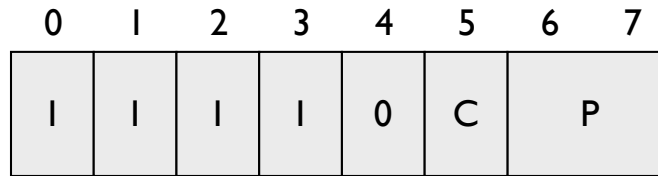
FFXX:RIID:[plen][prefix]:XXXX:XXXX

Unicast-Prefix-based Multicast Addresses

SAM = 2 Reserved

SAM = 3 Reserved

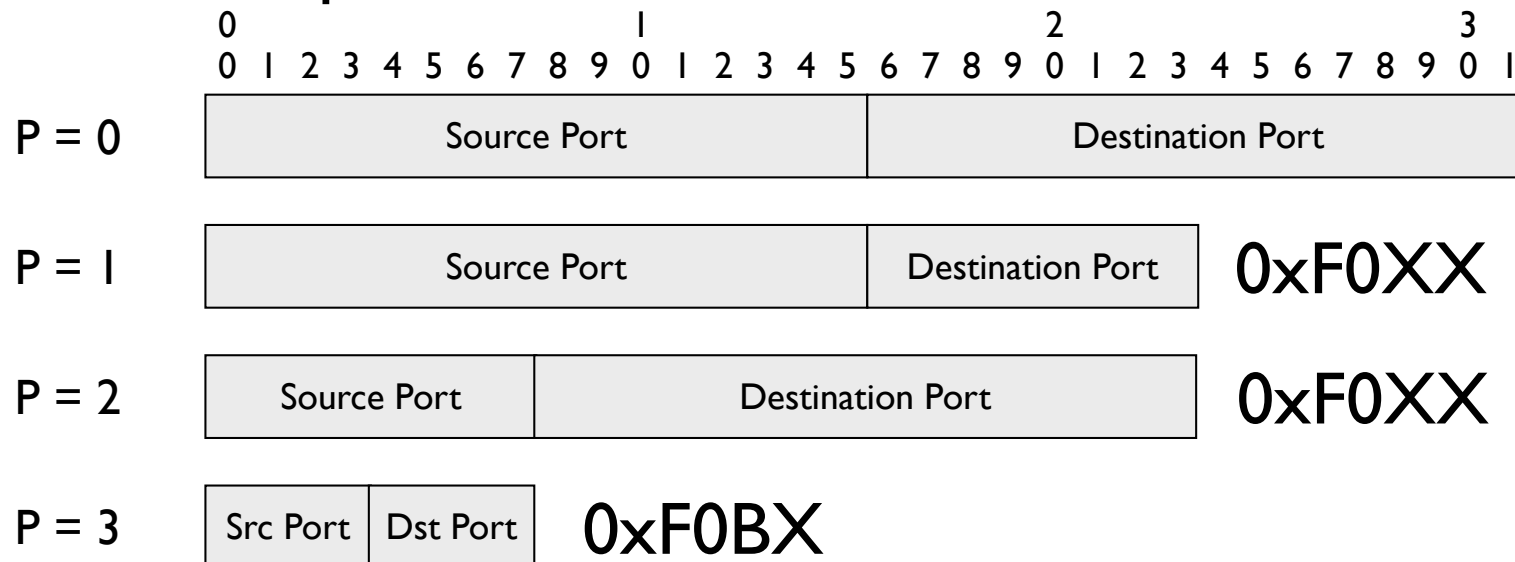
UDP



Checksum Compression

0	Checksum carried in-line.
1	Checksum elided with higher-layer end-to-end integrity checks.

Port Compression



Some Examples

IEEE 802.15.4 Header - 22 bytes

Length	FCF	DSN	PAN ID	Source Address (00-17-3B-FF-FE-11-22-33)	Destination Address (00-17-3B-FF-FE-44-55-66)	22 bytes
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Link-Local Unicast (fe80::0217:3bff:fe11:2233 → fe80::0217:3bff:fe33:4455)

Dispatch	IPHC	NHC	UDP Ports	UDP Checksum	6 bytes
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Link-Local Multicast (fe80::0217:3bff:fe11:2233 → ff02::1)

Dispatch	IPHC	Mcast Grp	NHC	UDP Ports	Checksum	7 bytes
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Global Unicast (2001:5a8:4:3721:0217:3bff:fe11:2233 → 2001:4860:b002::68)

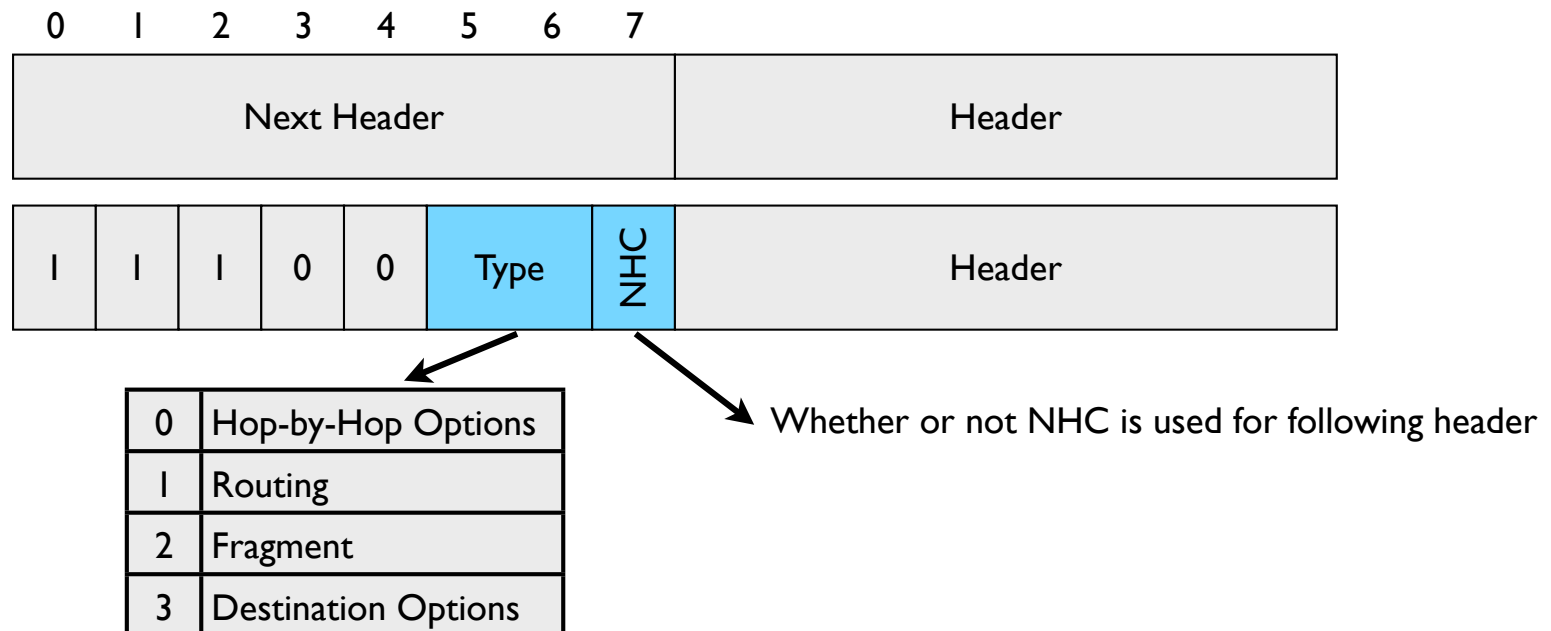
Dispatch	IPHC	CID	Hop Lim	Dst IID (0068)	NHC	UDP Ports	UDP Checksum	10 bytes
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What is Compressible?

- Unicast
 - Link-local (including unspecified address)
 - Global (with prefix match in context db)
- Multicast
 - Most useful link-local addrs (all-nodes)
 - Other well-known addrs (all-dhcp-servers)
 - Solicited node addresses
 - Unicast-Prefix-Based addrs

Extension Headers?

- draft-04 can only apply NHC to a header directly following IPHC.
- Support compressed UDP header if IPv6 Extension Headers fall in between?
- One proposal:



Recap

- **IP Header Compression**
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Other Notes

- ISA100 will use HC defined in draft-04
- Support for extension headers?
- Draft is stable → move to LC soon?