



Transport Layer Part 5

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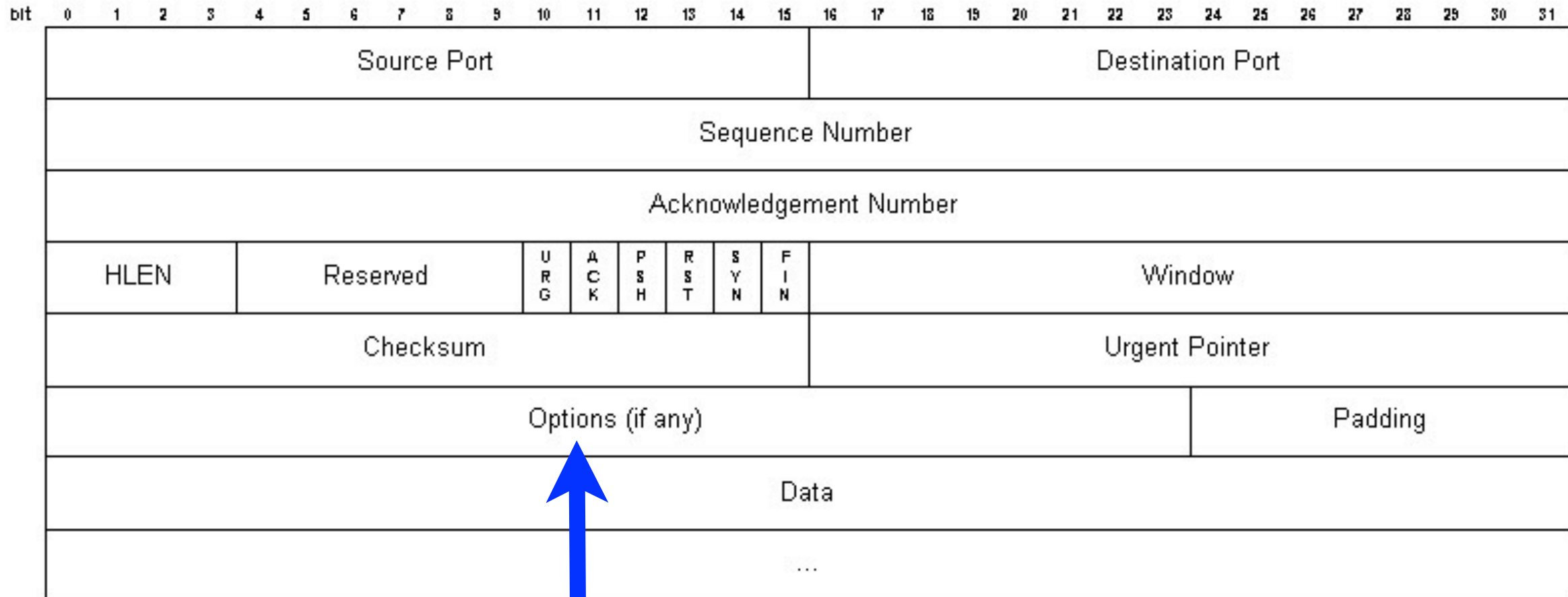
EECS 325/425
Fall 2018

*“That’s who we arrrrrrre ...
That’s how we rollllll ...”*

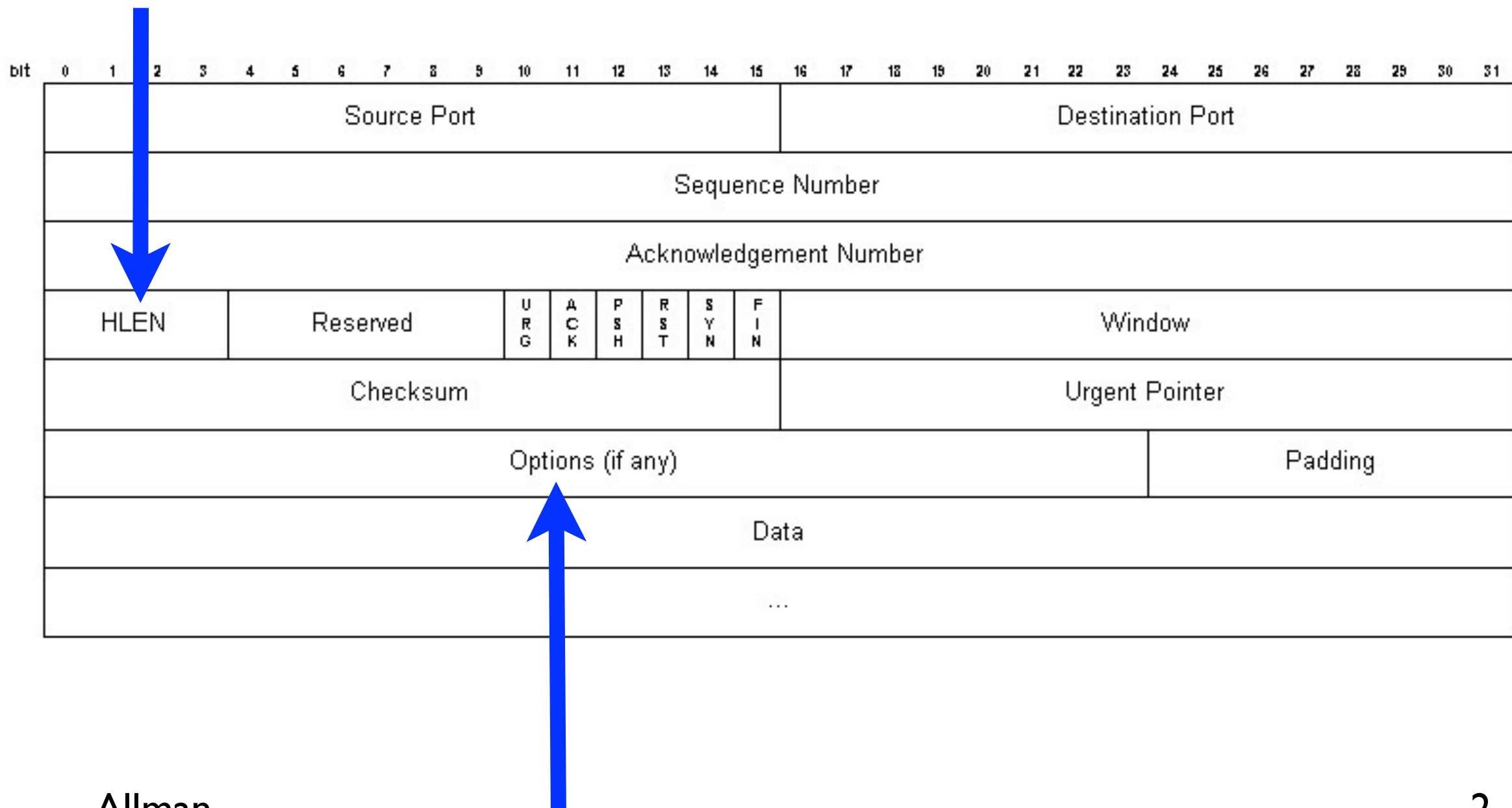
TCP Options

bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Source Port																Destination Port																
Sequence Number																																
Acknowledgement Number																																
HLEN				Reserved						U R G	A C K	P S H	R S T	S Y N	F I N	Window																
Checksum																Urgent Pointer																
Options (if any)																								Padding								
Data																																
...																																

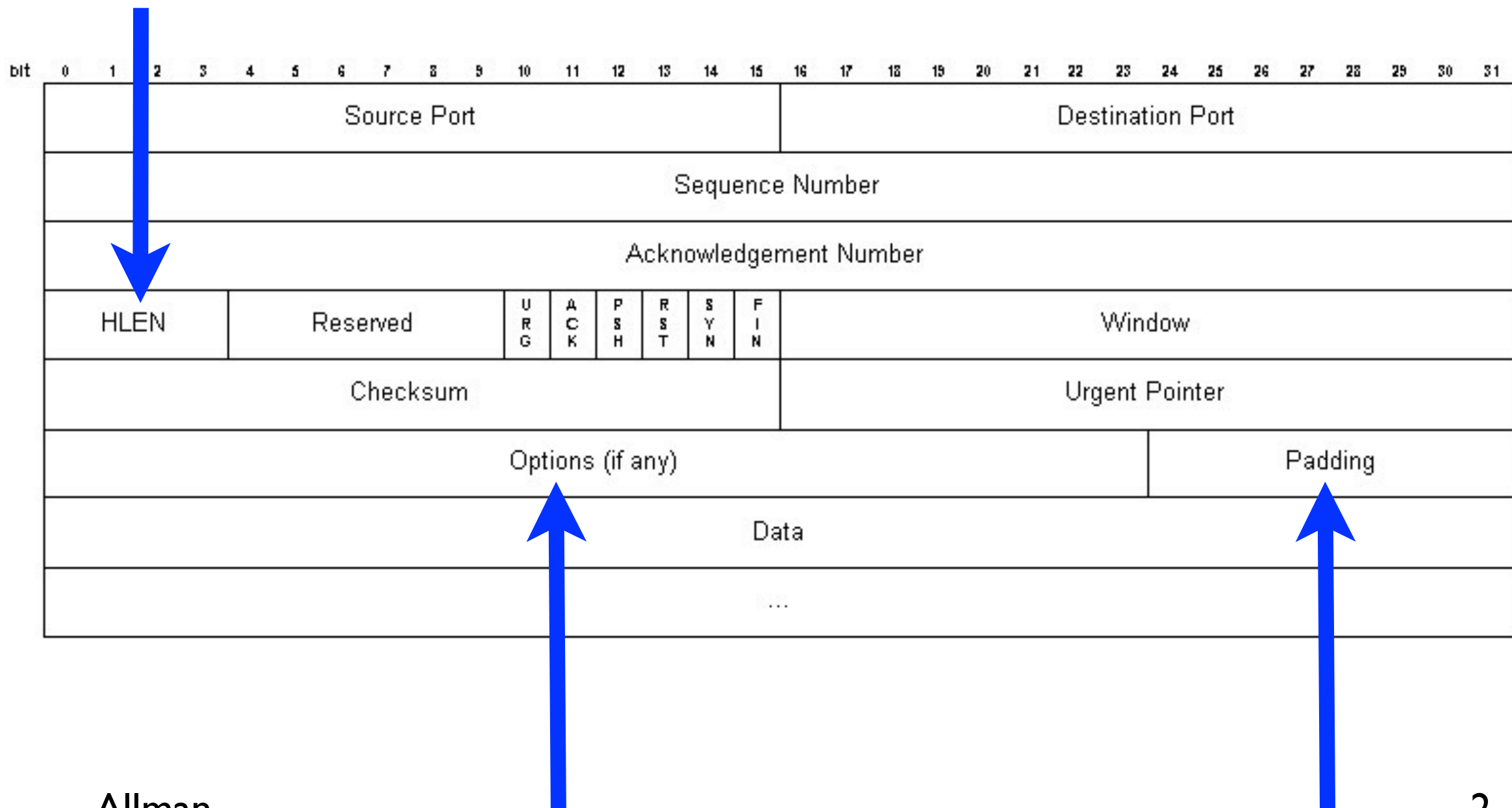
TCP Options



TCP Options



TCP Options



TCP Option Format

- Canonical form:

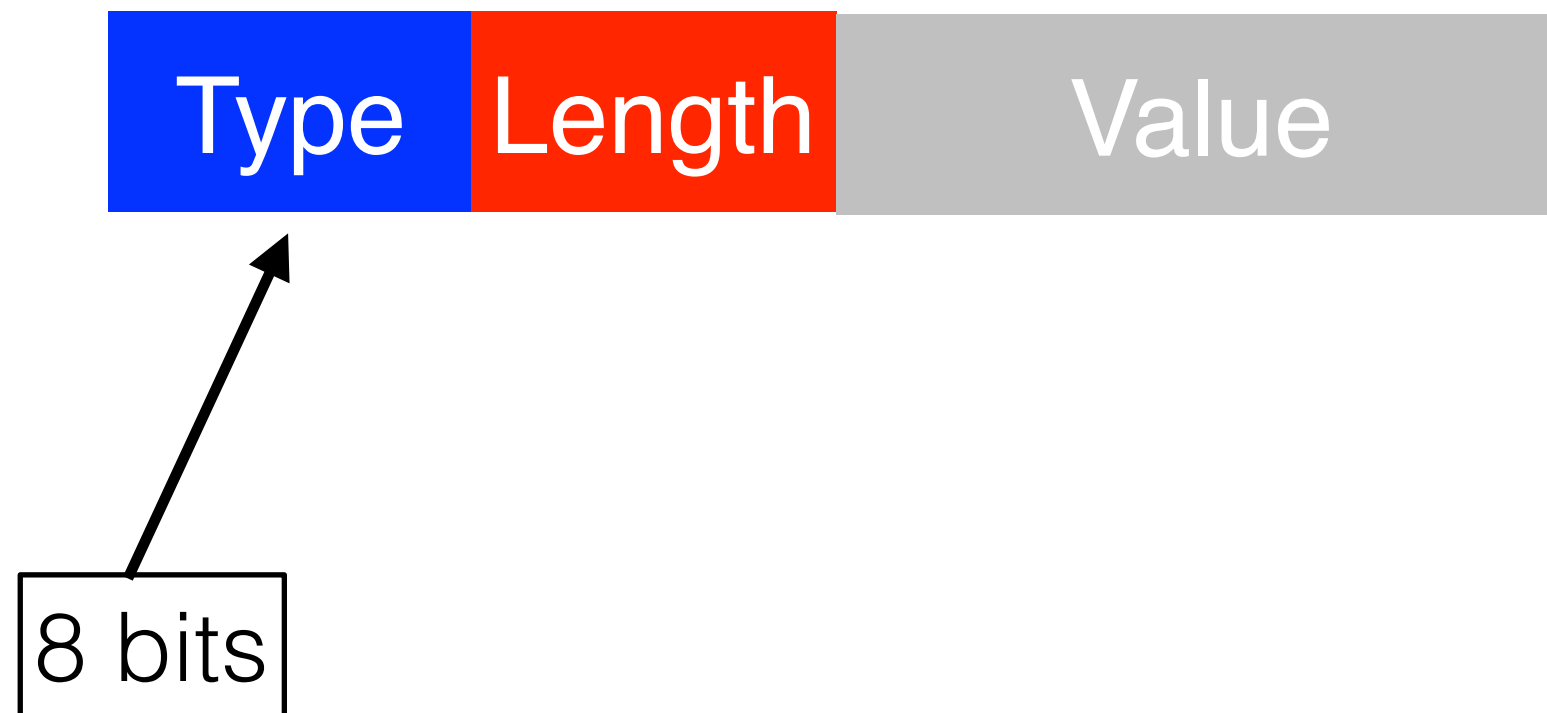
TCP Option Format

- Canonical form:



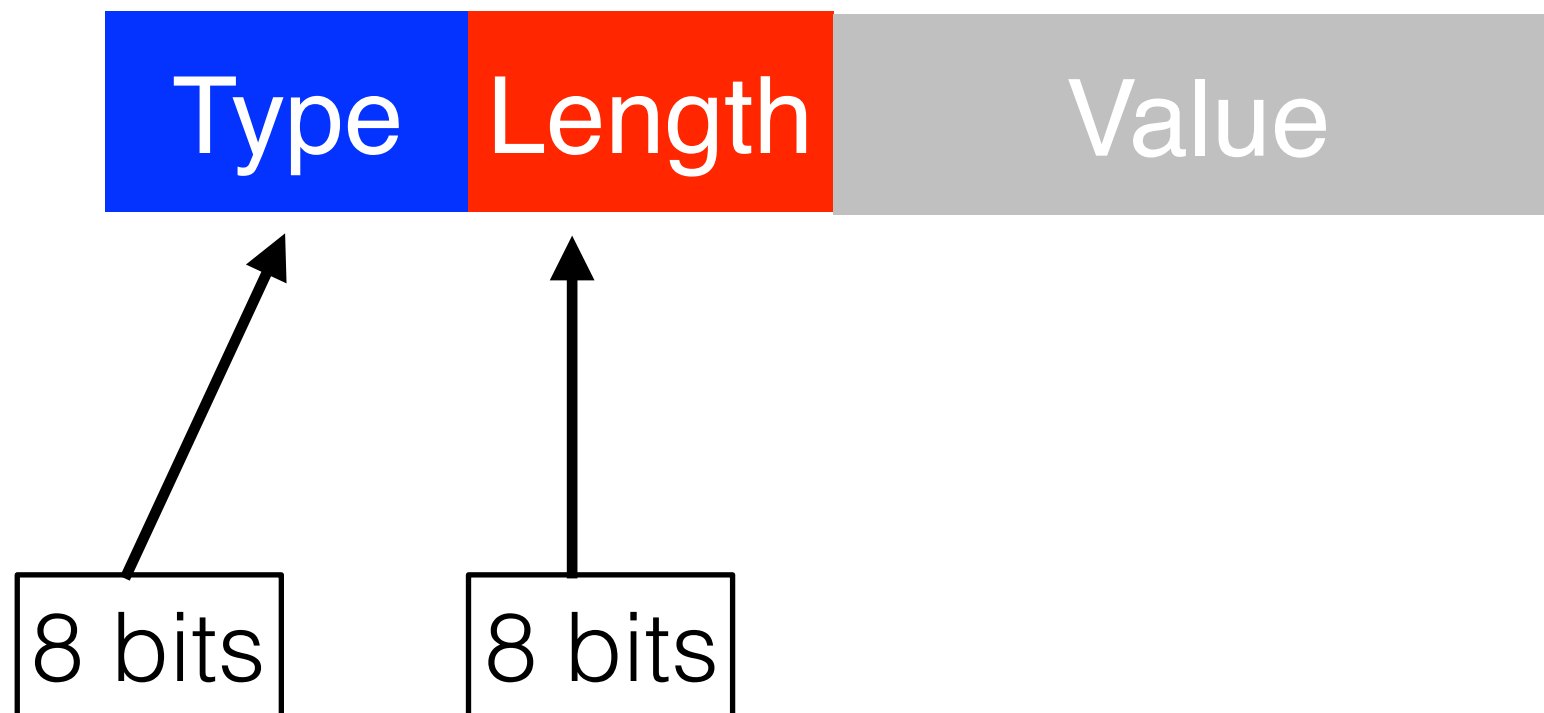
TCP Option Format

- Canonical form:



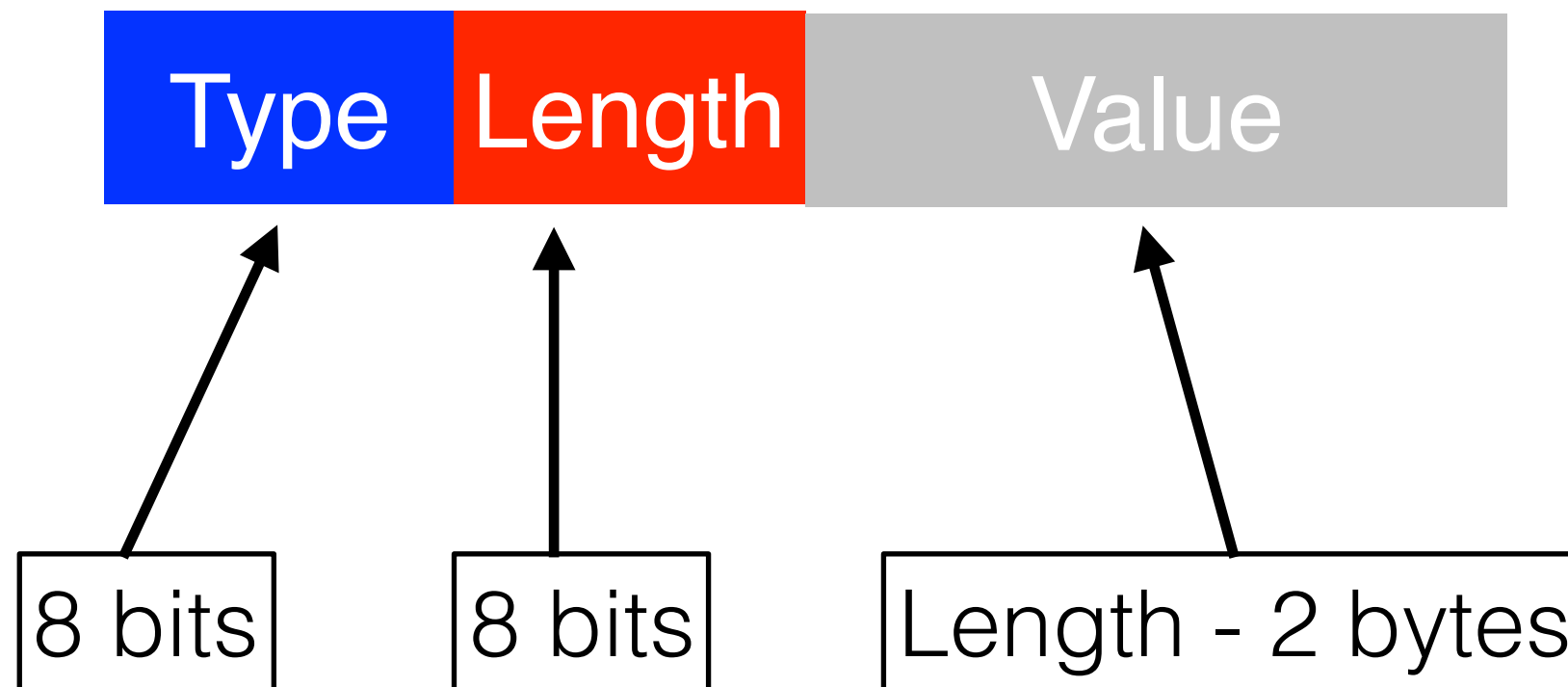
TCP Option Format

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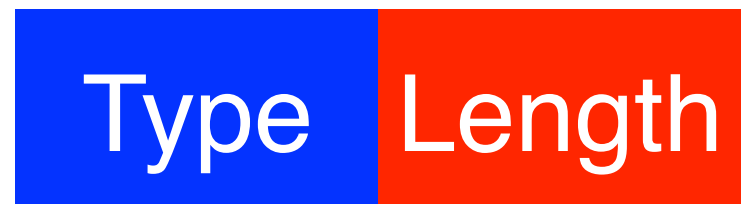


TCP Option Format

- Abbreviated form:

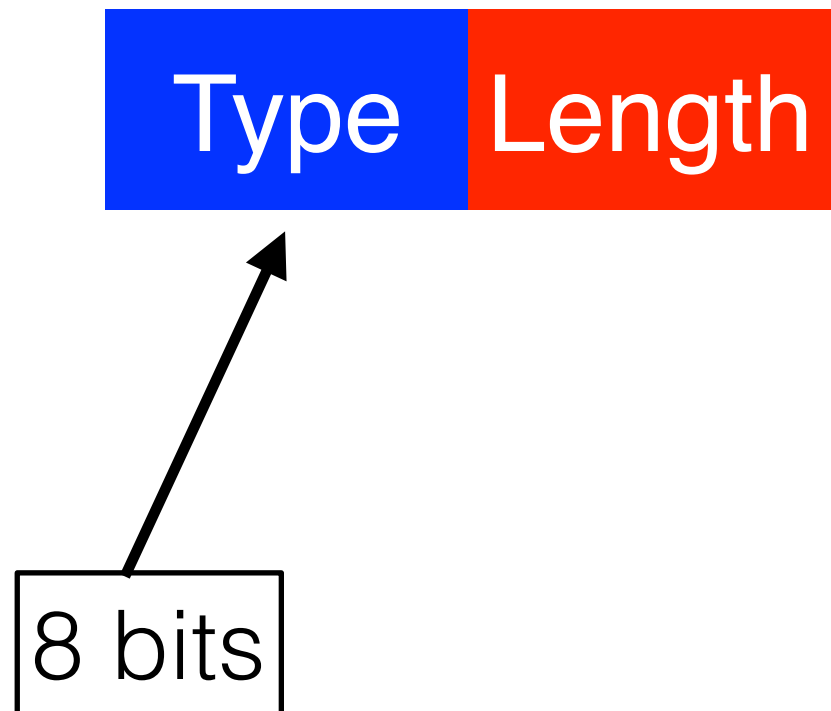
TCP Option Format

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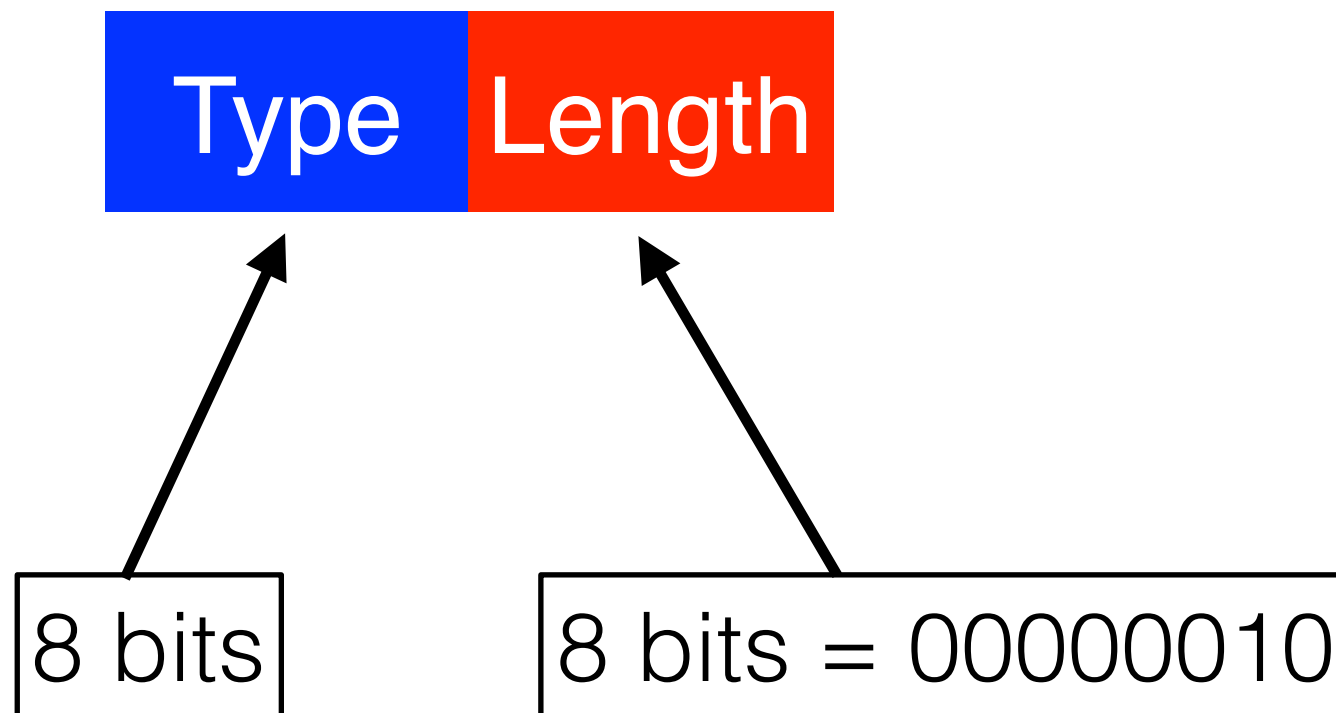
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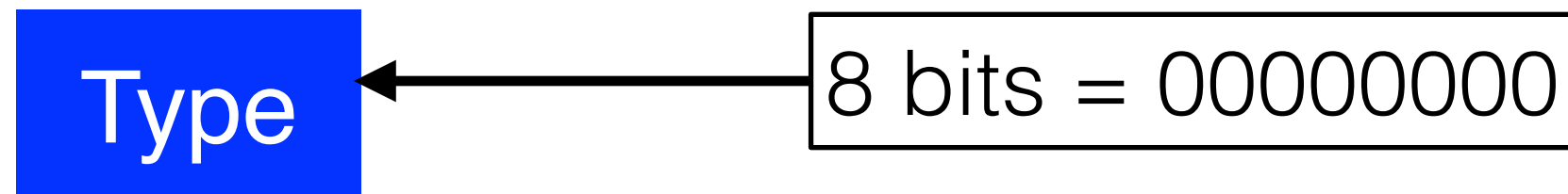
- Special options:

TCP Option Format

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 - End of options option:

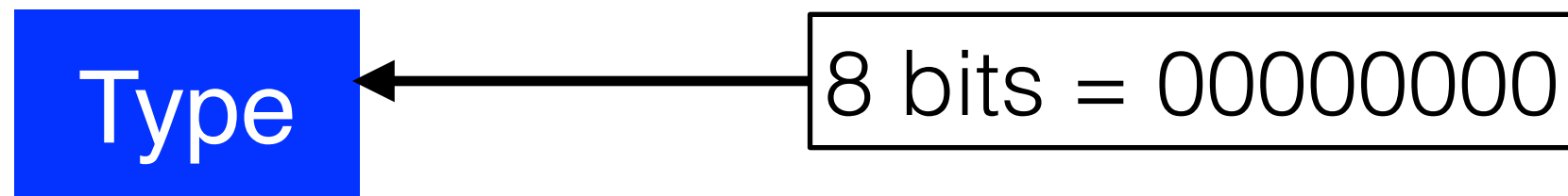
TCP Option Format

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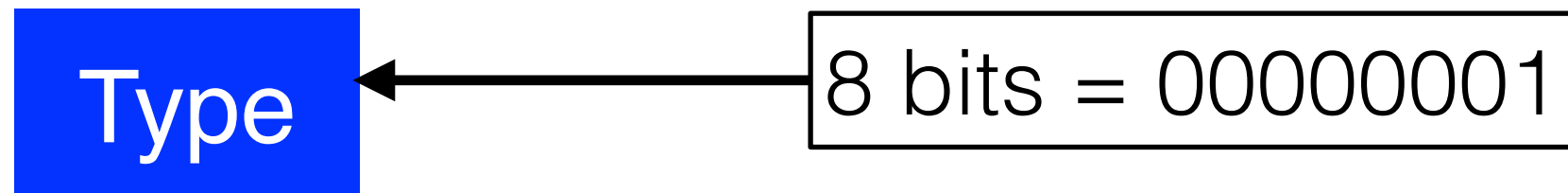


TCP Option Format

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- No-op option:



TCP Option Format

TCP Option Format

- Questions ...

TCP Option Format

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 - Do we need an end of options option?

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 - Do we need an end of options option?
 - Do we need a no-op option?
 - Why not invent a padding option that consumes the entire needed length?
 - Do we need a one byte option?
 - Why have 2 byte options instead of making more special options?

General Pattern

- Type / value is a design pattern of sorts in networks:

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```
HTTP/1.1 200 OK\r\n
Date: Thu, 27 Sep 2018 19:33:01 GMT\r\n
Server: Apache/2.4.34 (Fedora)\r\n
Last-Modified: Tue, 25 Sep 2018 17:22:44 GMT\r\n
ETag: "14-576b55a8e8100"\r\n
Accept-Ranges: bytes\r\n
Content-Length: 20\r\n
Content-Type: text/plain; charset=UTF-8\r\n
\r\n
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Value