CS2105 Lecture 5
UDP and TCP

10 February, 2014

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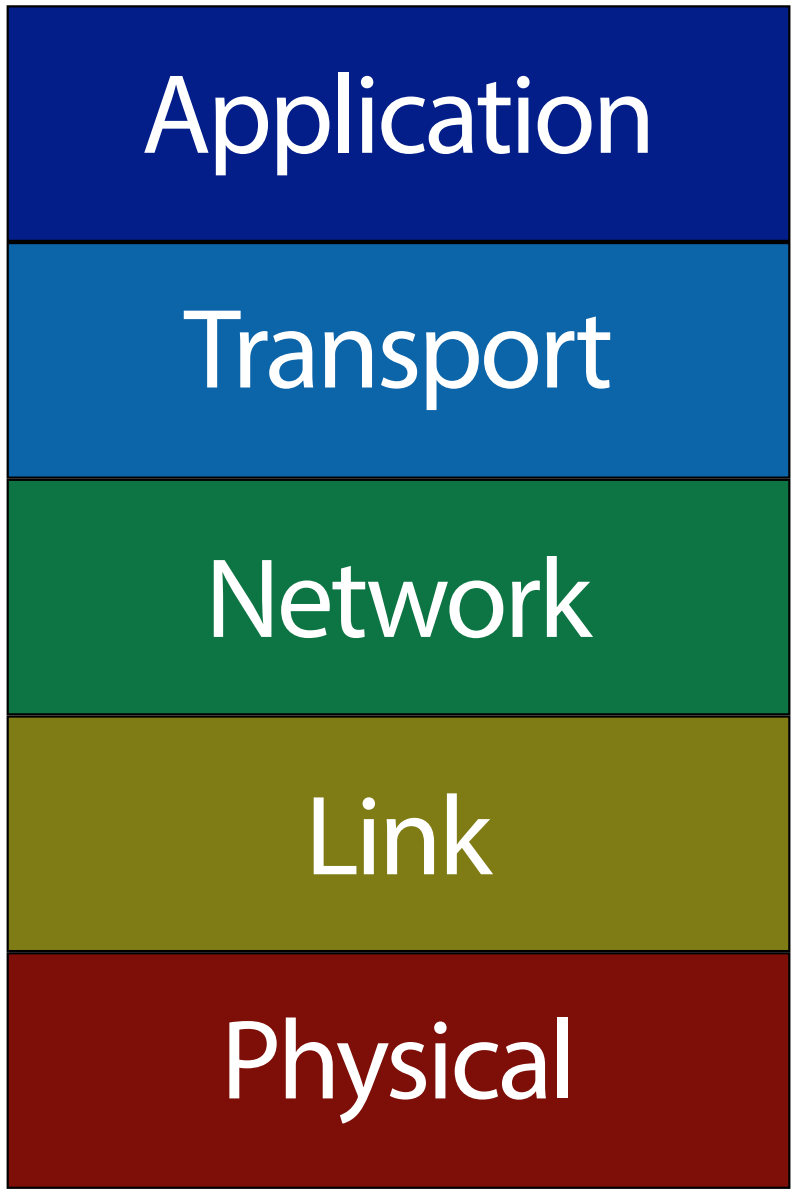
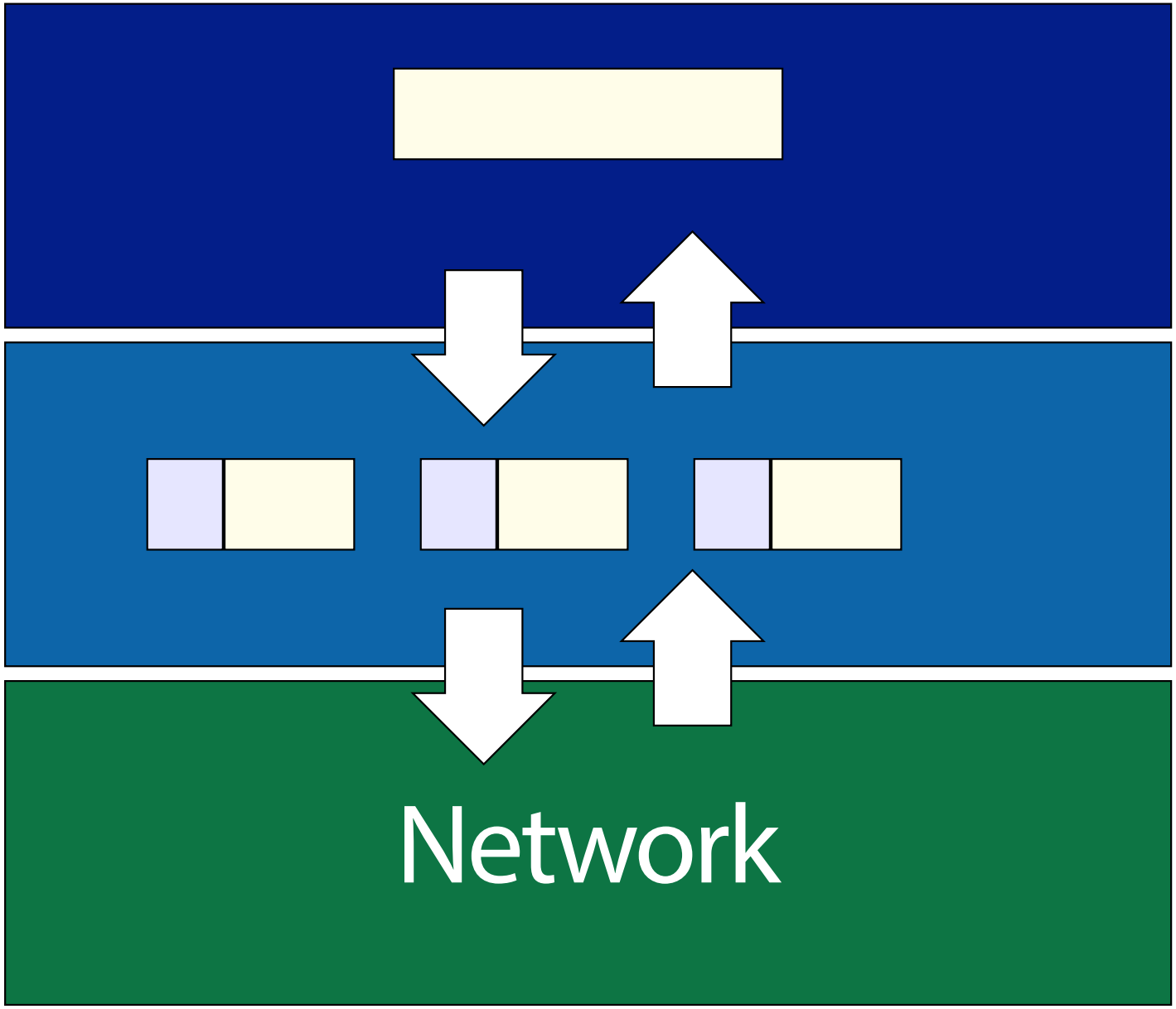
After this class, you are expected to:

- appreciate the simplicity of UDP and the service it provides
- know how to calculate the checksum of a packet
- understand the operation of TCP, particularly, the sequence number, the acknowledgement number, retransmission, the receiver window, and connection setup/termination.

``You Won't Believe How Simple the UDP Protocol is. But The Complexity of TCP Will Make You Cry."

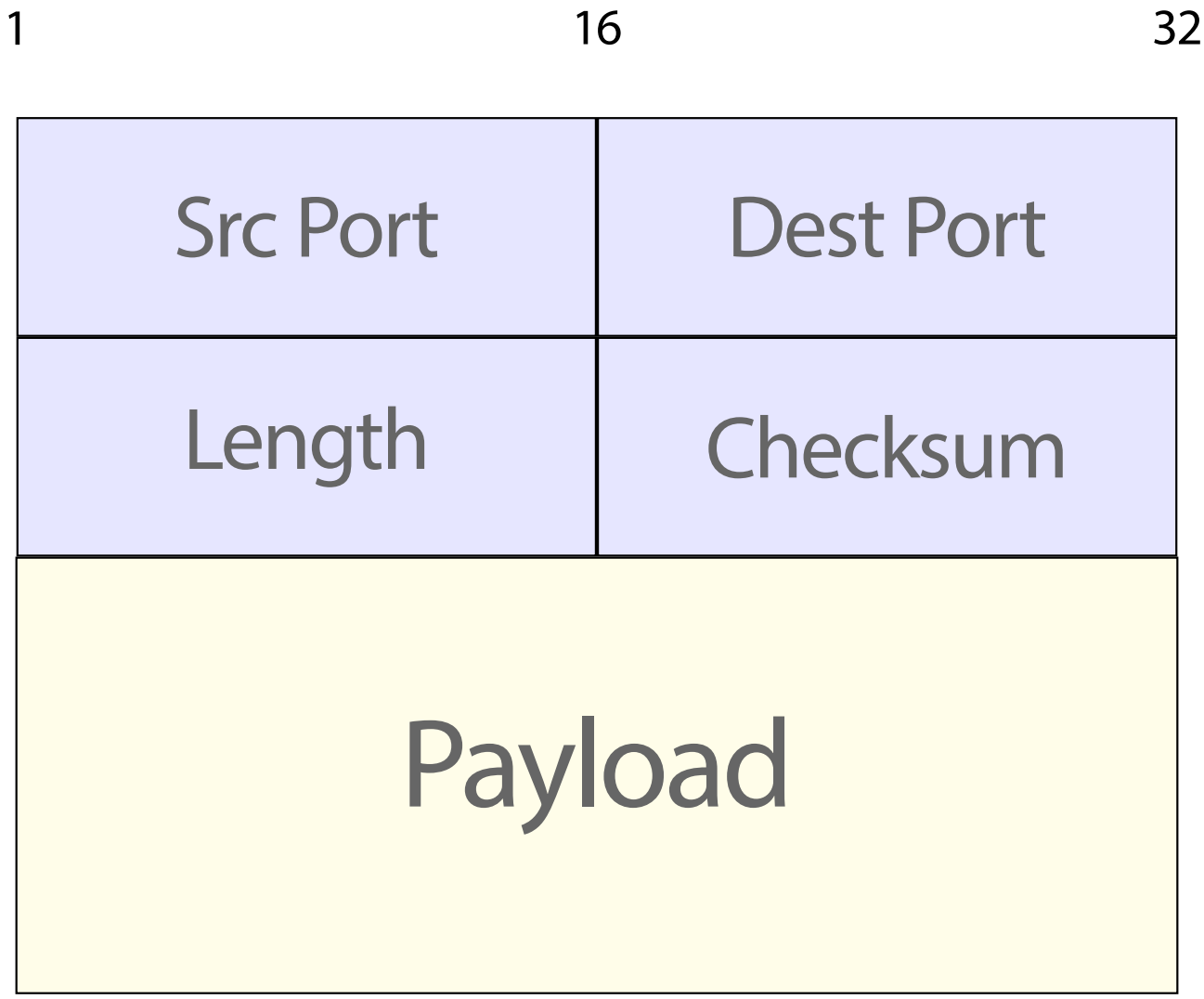

Application
Transport
Network
Link
Physical


Network

UDP
User Datagram Protocol

UDP
User Datagram Protocol

Details of Internet protocols are described in documents known as *Request for Comments* (RFC). UDP is such a simple protocol that its RFC `http://www.ietf.org/rfc/rfc768.txt` is only 3 pages. Interested students should check out the RFC for further details of UDP.


1
16
32
Src Port
Dest Port
Length
Checksum
Payload

sender computes $f(P) = c$

sends P and c

receiver receives P' and c'

checks if $f(P') = c'$

```
1011 1011 1011 0101
1000 1111 0000 1100
```

```
1011 1011 1011 0101
1000 1111 0000 1100
```

Quick recap on binary addition:

- 0+0 = 0
- 1+0 = 0+1 = 1
- 1+1 = 10
- 1+1+1 = 11

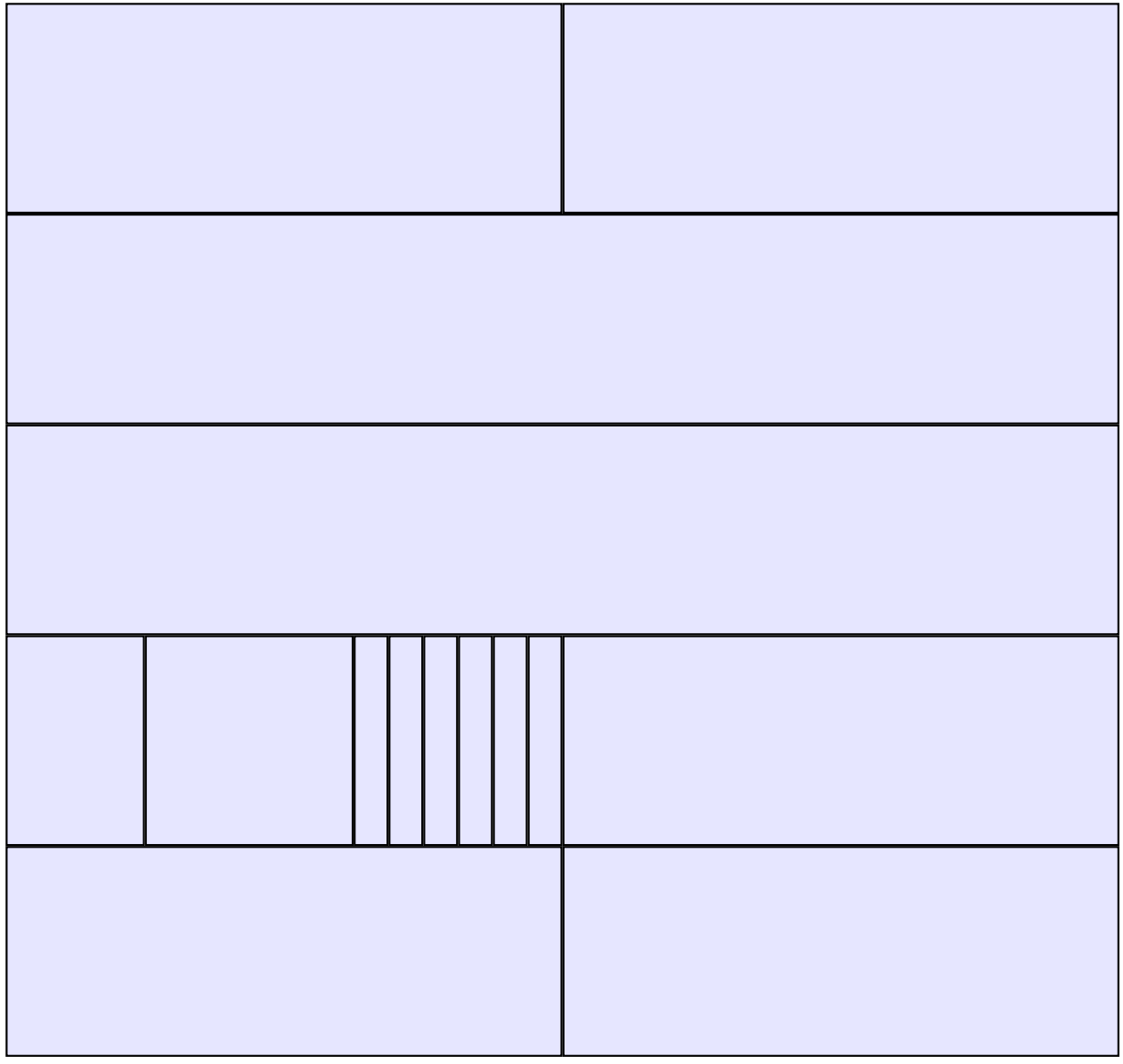
```
0110 0110 0110 0000
0101 0101 0101 0101
1000 1111 0000 1100
1011 0101 0011 1101
```

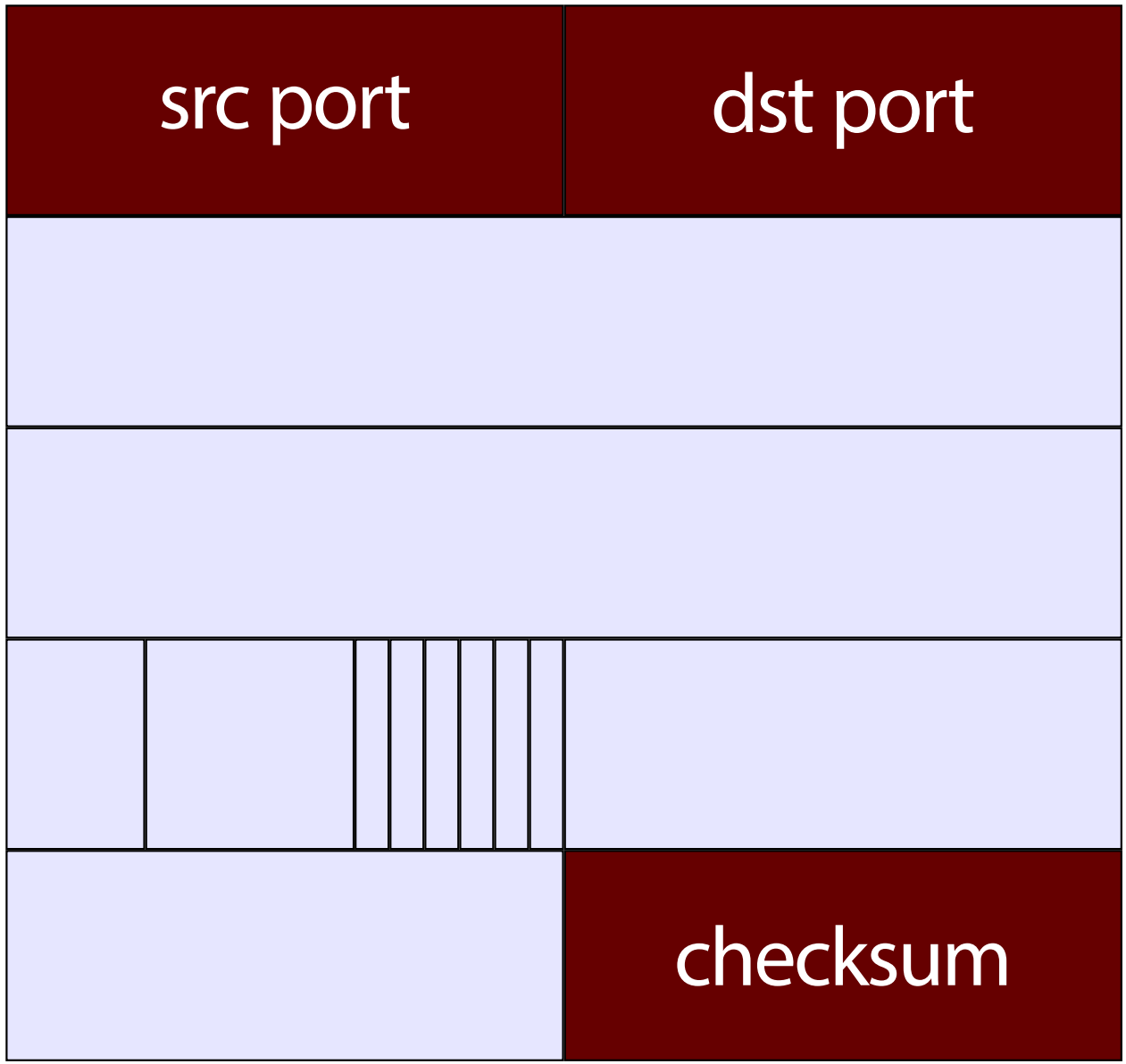
TCP
Transport Control Protocol

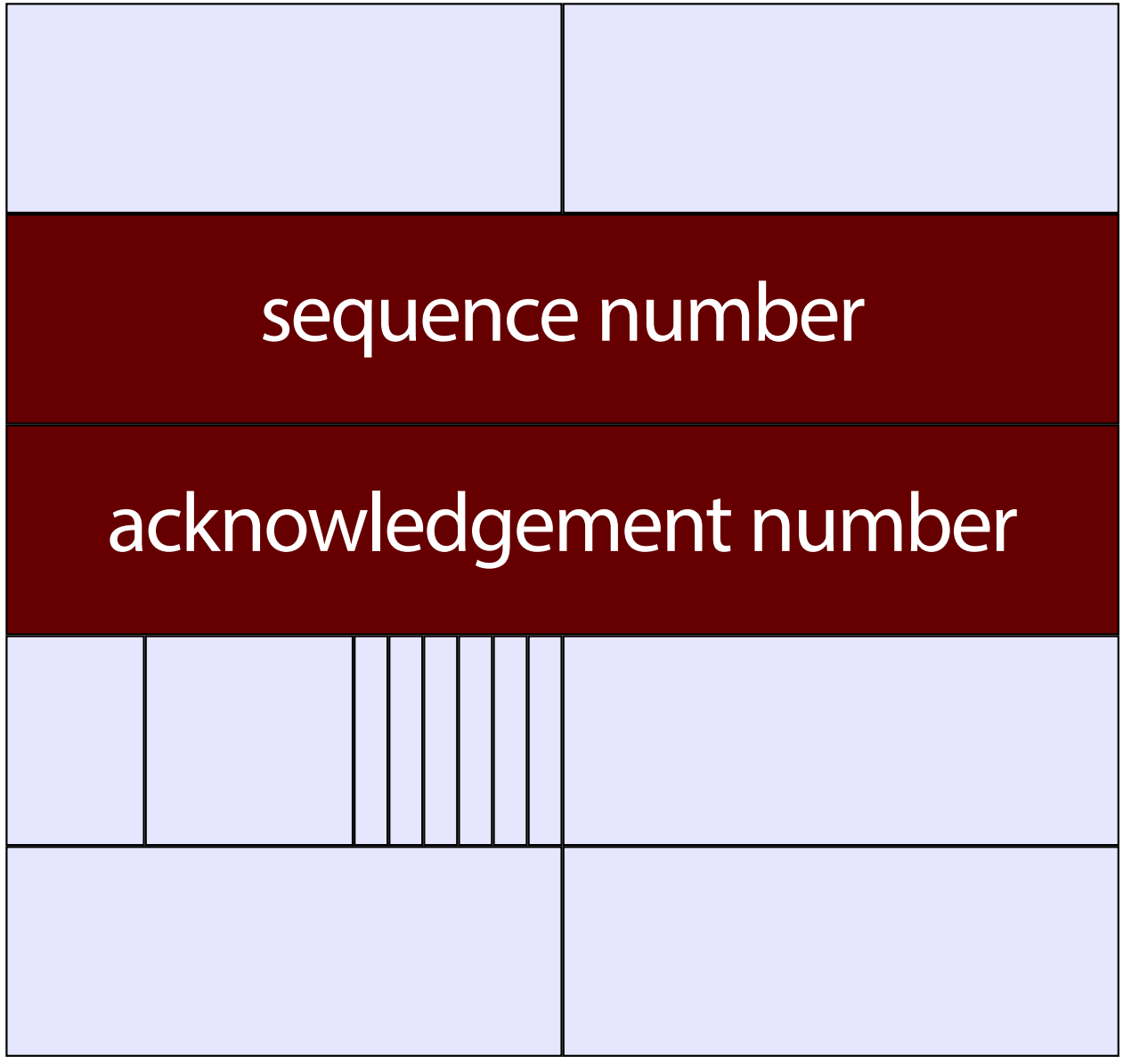
TCP
Transport Control Protocol

In constrast to UDP, TCP is complex and is described in tens of RFCs, with new mechanisms or tweaks introduced throughout the years, resulting in many variants of TCP. We will only be scratching the surface of TCP in CS2105.

	GBN	SR
ACK	cumulative	selective
out-of-order	ignore	keep
retransmit	all unack	one unack
timer	earliest unack	one per unack



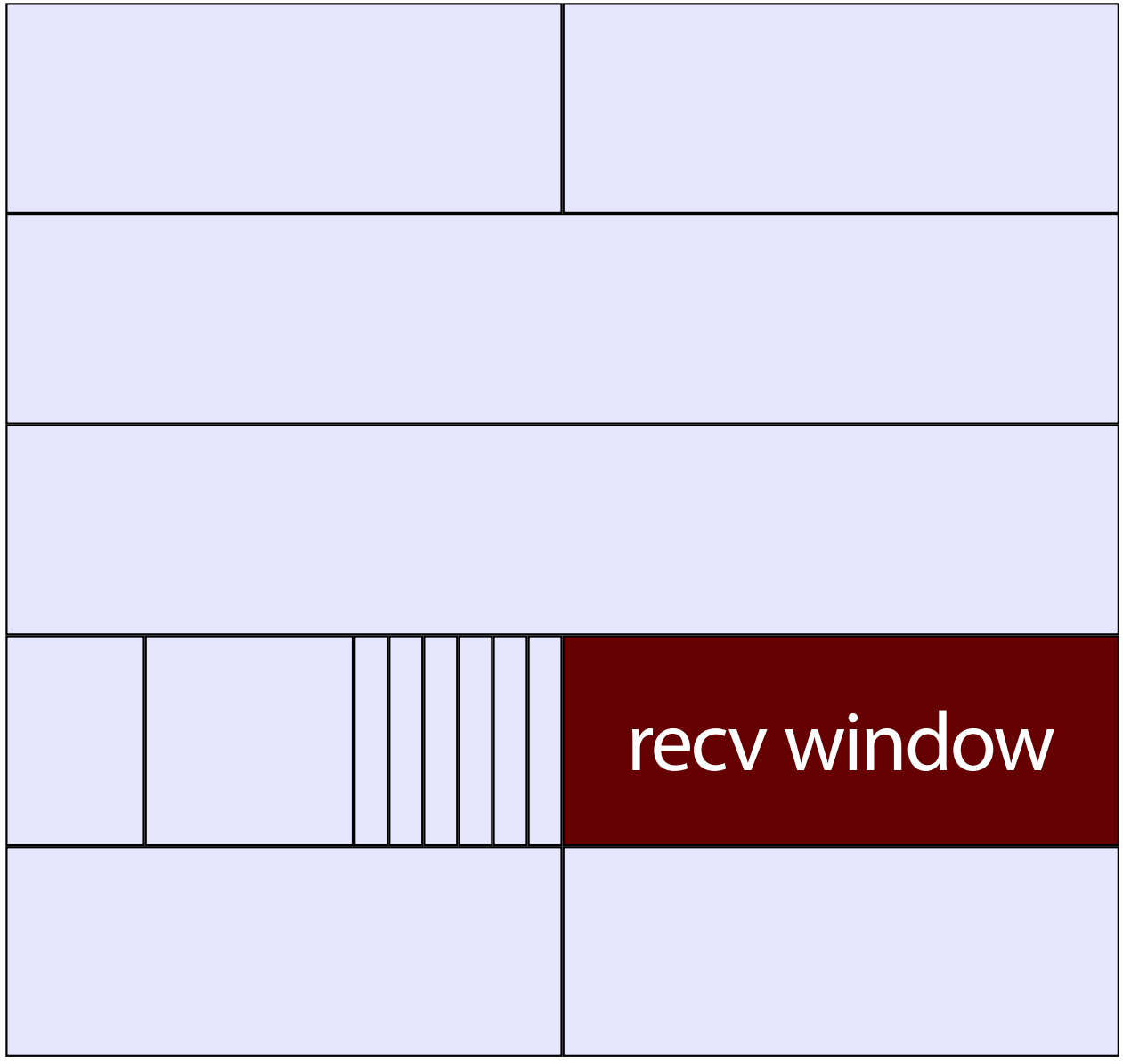

src port
dst port
checksum


sequence number
acknowledgement number

Sender's buffer

Receiver's buffer

Setting RTO


recv window

Setting rwnd