Communication Networks

Spring 2019

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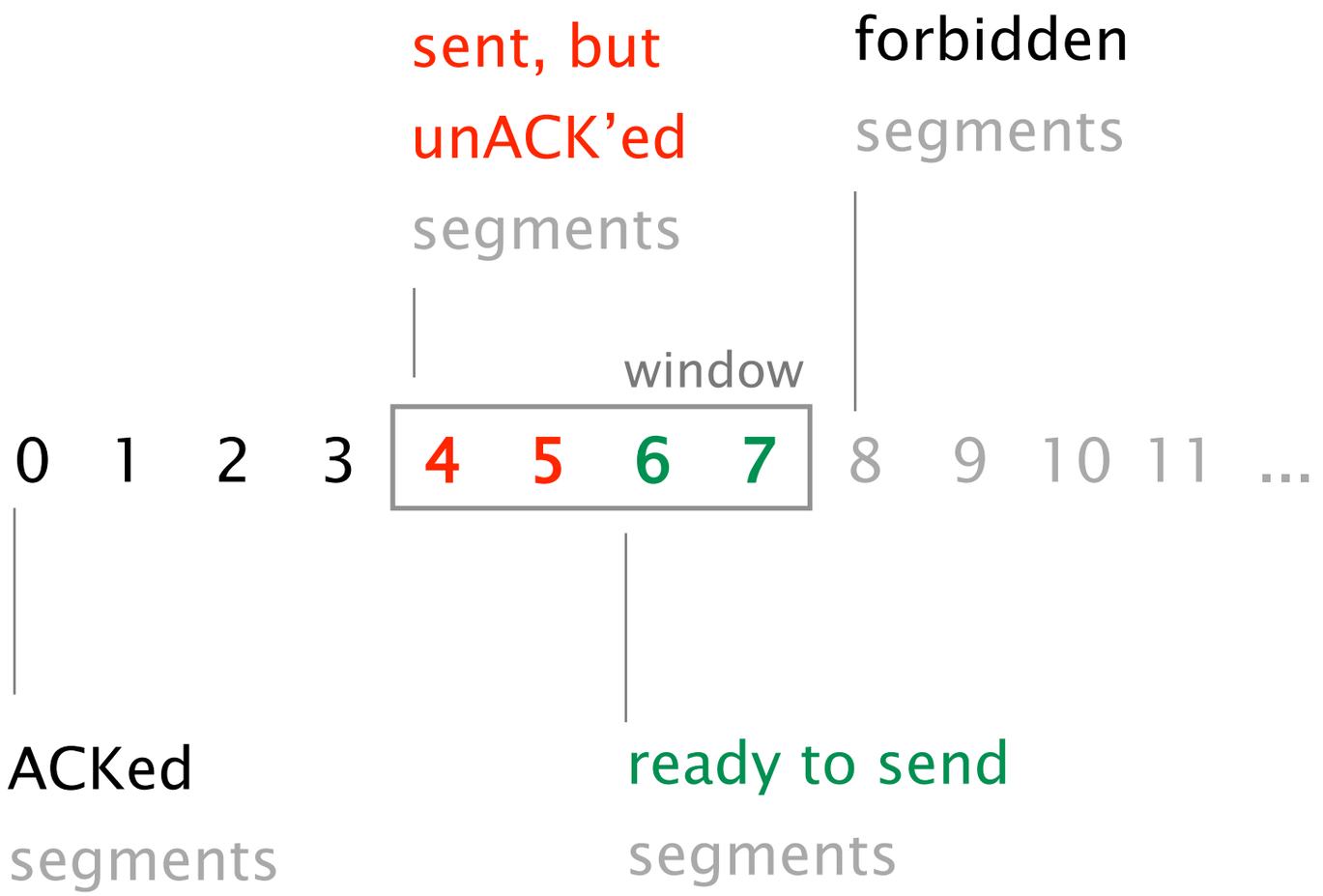
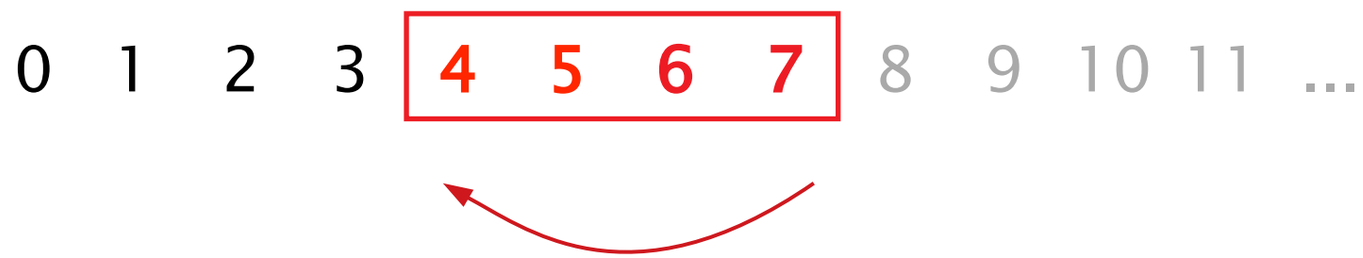
Next Week on Communication Networks

Reliable Transport Project

Go-Back-N is a reliable transport protocol using a **sender window**, **ACKs** and **timeout.**



Go-Back-N is a reliable transport protocol using a **sender window**, **ACKs** and **timeout.**



go back N segments and **resend all**

(window size)

The **receiver** typically uses

cumulative acknowledgements.

ACK X = X is the **next expected segment**

every segment **up to X is ACKed**

GBN waits for a timeout before segments are retransmitted.

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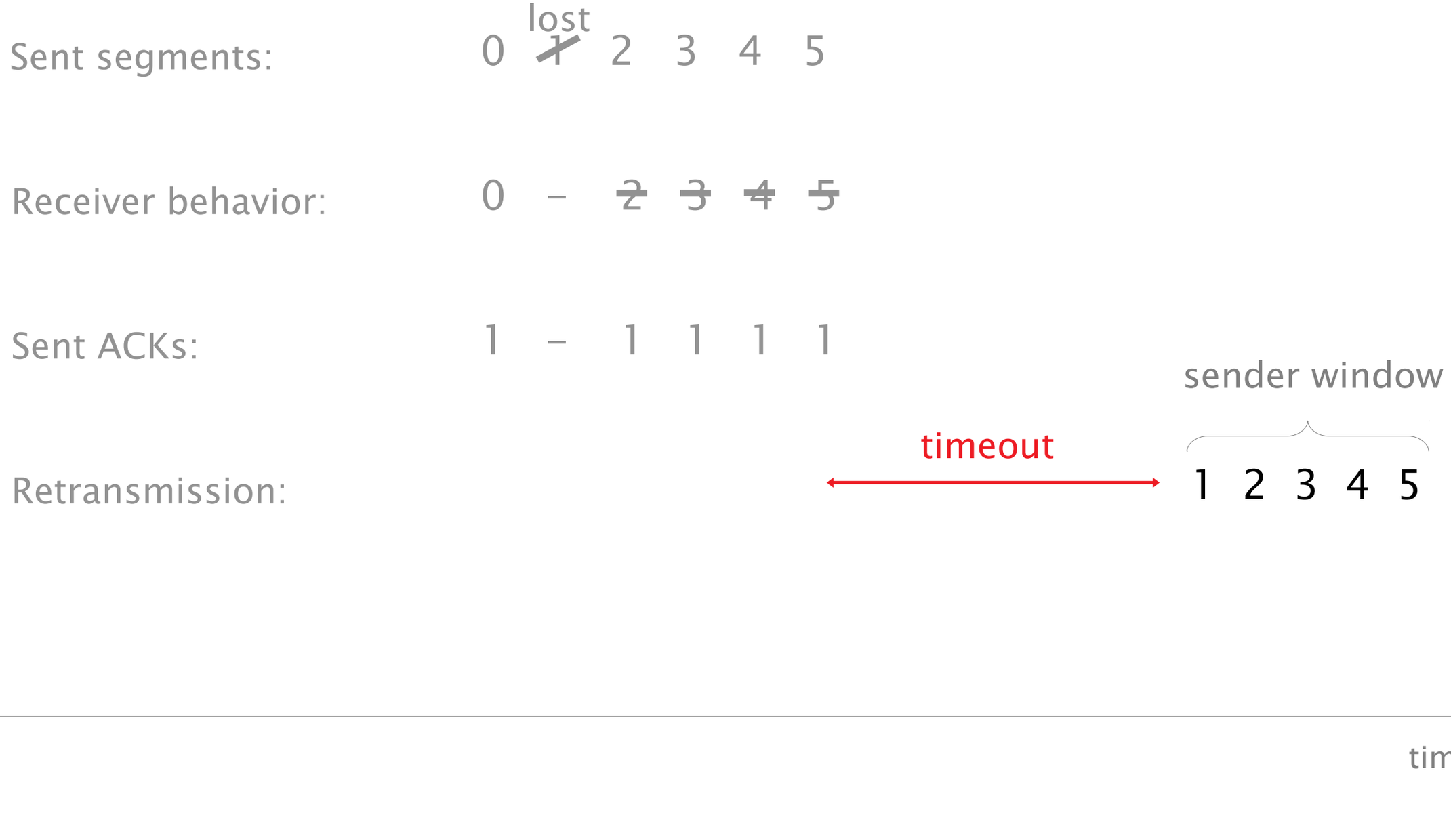


Let’s see how it works in practice visually.

www.ccs-labs.org/teaching/rn/animations/gbn_sr/

Retransmitting the whole window **is wasteful.**

How can we do better?

Selective Repeat does not wait for timeout
and can increase performance.

Sent segments:	0	~~1~~	2	3	4	5
Receiver behavior:	0	–	2	3	4	5
Sent ACKs:	1	–	1	1	1	1
Retransmission:						

Out-of-order segments
are **buffered at the receiver**

time

Selective Repeat does not wait for timeout and can increase performance.

Sent segments:	0 ~~1~~ 2 3 4 5	
Receiver behavior:	0 – 2 3 4 5	Out-of-order segments are **buffered at the receiver**
Sent ACKs:	1 – 1 1 1 1	
Retransmission:	No timeout (yet). **When** should we retransmit?	

Selective Repeat does not wait for timeout and can increase performance.

Sent segments:	0 ~~1~~ 2 3 4 5	
Receiver behavior:	0 – 2 3 4 5	Out-of-order segments are **buffered at the receiver**
Sent ACKs:	1 – 1 1 1 1	

Retransmission: No timeout (yet). **When** should we retransmit?

- Full ACK info (complex)
- Duplicate ACKs (simple)

time

Fast Retransmit is based on **duplicate ACKs.**

Sent segments:	0	~~1~~	2	3	4	5
Receiver behavior:	0	–	2	3	4	5
Sent ACKs:	1	–	1	1	1	1

Out-of-order segments are **buffered at the receiver**

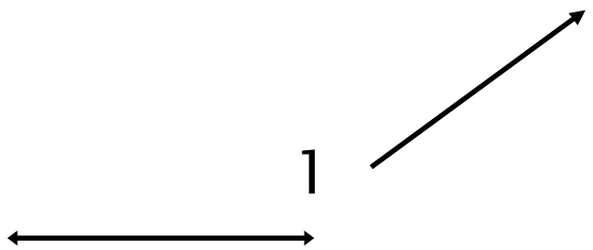
Retransmission: 1

3 duplicate ACKs

time

Fast Retransmit is based on **duplicate ACKs**

Sent segments:	0	~~1~~	2	3	4	5	1
Receiver behavior:	0	–	2	3	4	5	
Sent ACKs:	1	–	1	1	1	1	6
Retransmission:				1			



3 duplicate ACKs

receiver delivers buffered segments

This Weeks Exercise

GBN and DNS

The first part of the exercise
is all about Go-Back-N.

First

Warm-up questions (8.1) prepare you for the following question (8.2).

Discuss with your classmates!

Second

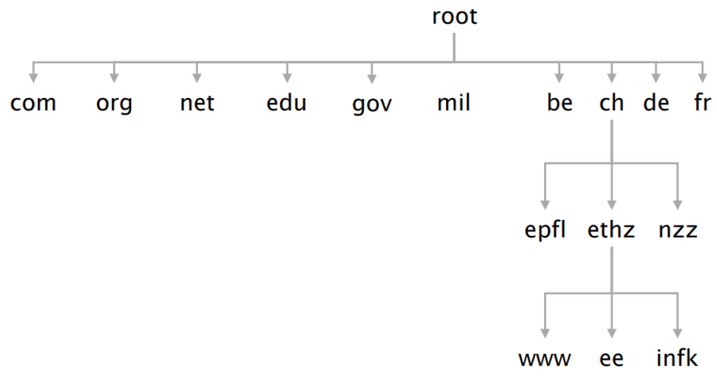
8.2 is an exam question from 2017.

Read the instructions carefully!

The last three questions encourage
you to **have a look at DNS responses.**

8.3 Hierarchy

DNS is organized
into **hierarchical zones.**
How are they connected?



8.4 Caching

The load on **authoritative DNS** servers is
reduced by caching on **local DNS** servers.
How is this cache managed?

8.5 One Query,
Many Responses

DNS can **return multiple IP addresses.**
Why is this useful?

The last three questions encourage
you to have a look at DNS responses.

Unix

```
dig ethz.ch
```

Windows

```
nslookup ethz.ch
nslookup -debug ethz.ch
```

provides more information