A Fairness Algorithm **version 0.1**
for

Dynamic Spatial Reuse
Avoiding HOL Blocking

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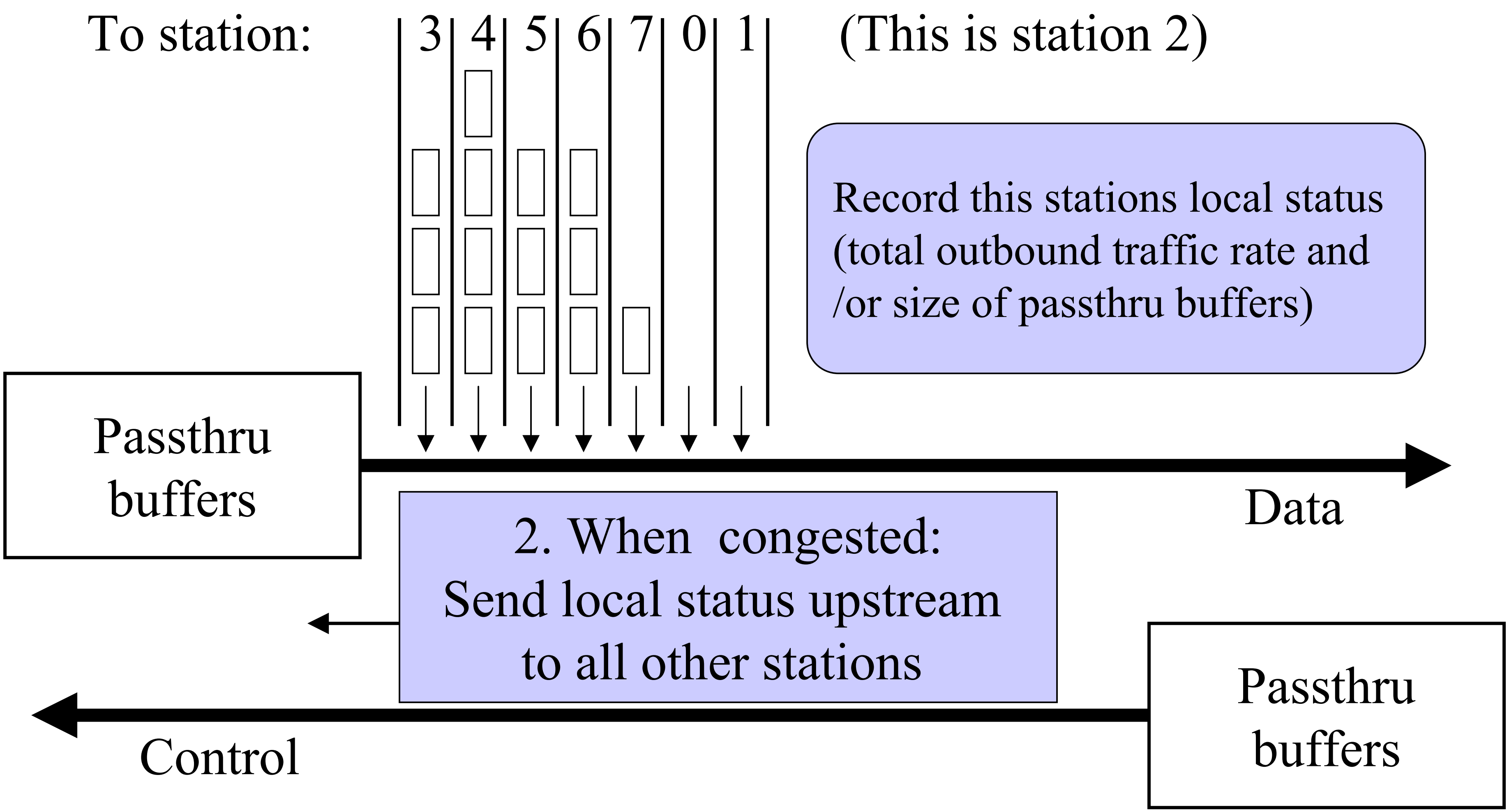
Non-HOL Blocking Fairness

- Assume:
  - Non-HOL Blocking Ingress Queues
- We show a fairness algorithm with:
  - Control Packets (broadcast or point-to-point)
  - State proposal
  - State machine proposal

- We are considering one ring/direction (same in the other direction)

Main idea

Assume we have NHOLB queueus

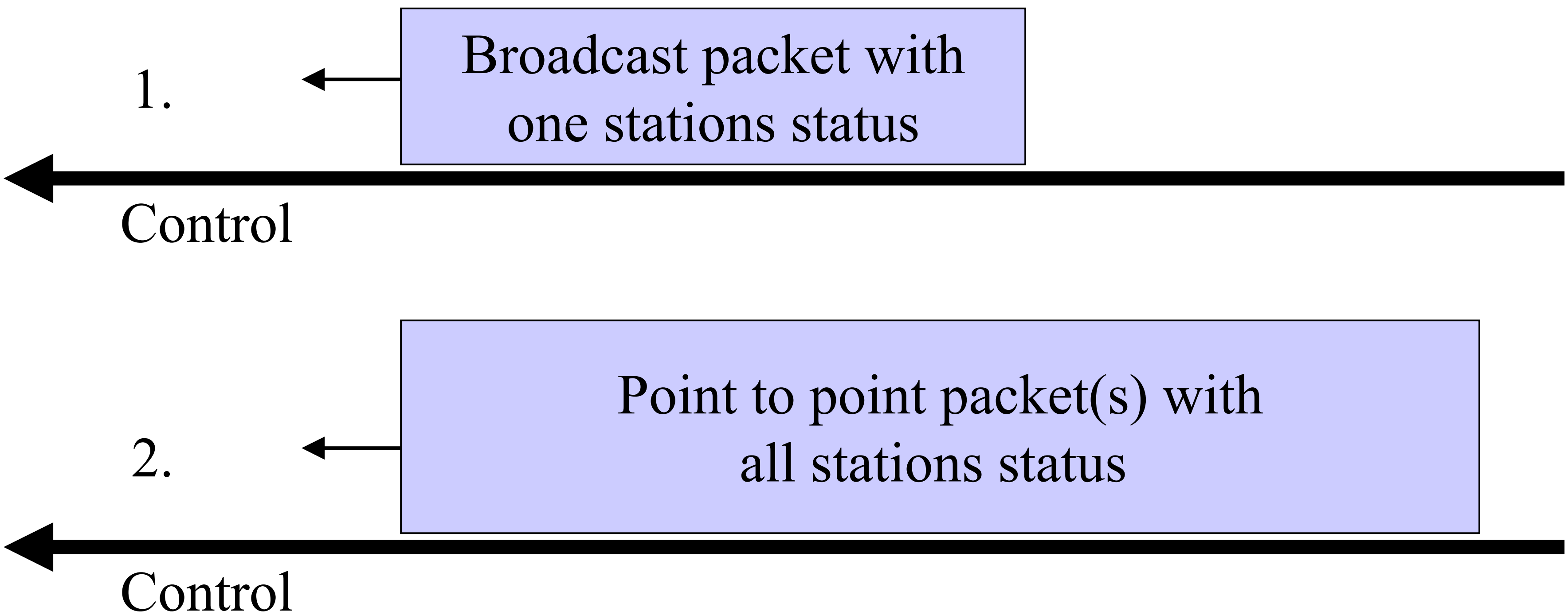


Control packets

Either 1. each stations broadcasts its own status data

or (to the same effect)

2. one or more control packets that contain all stations status data circle the ring.



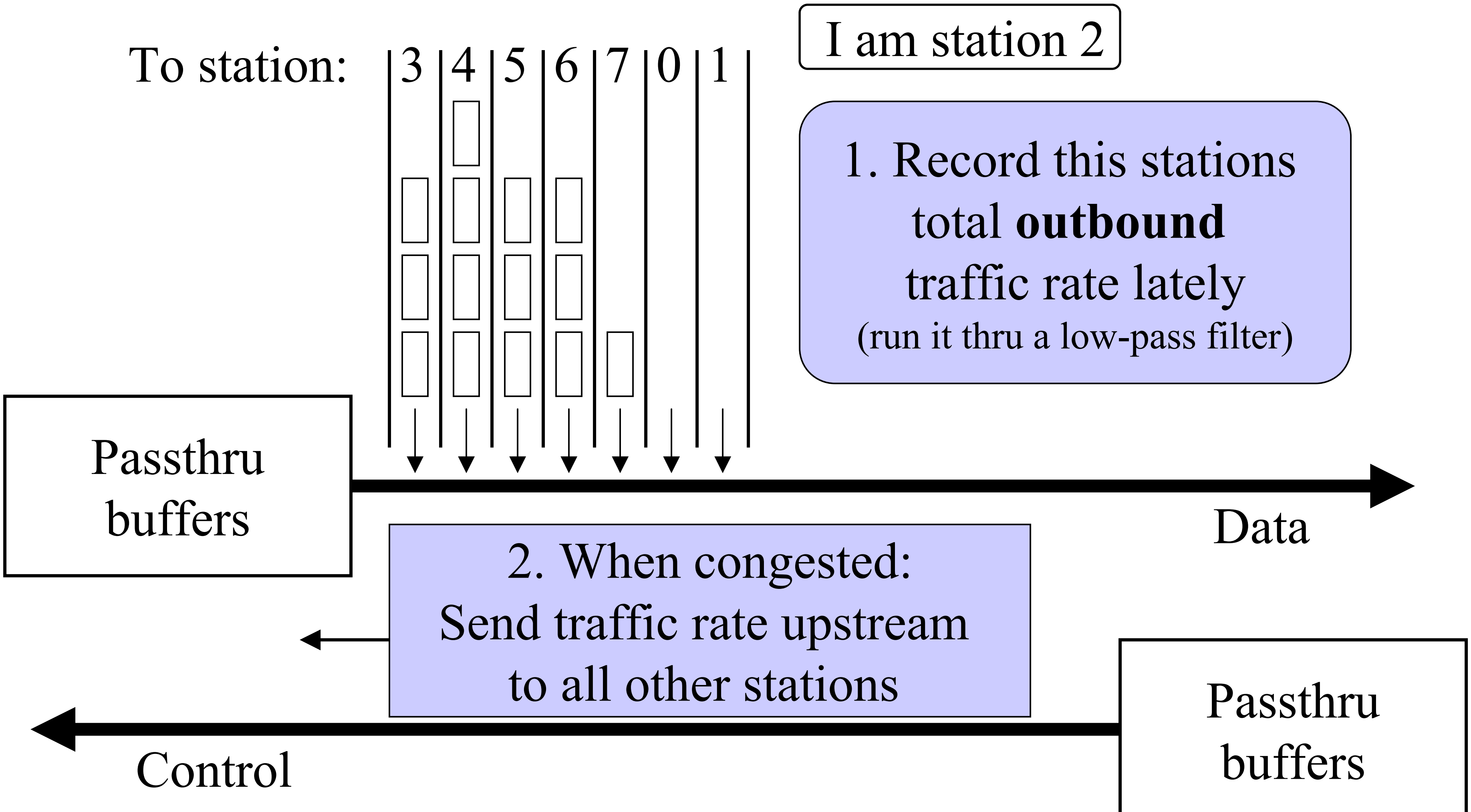
Each stations responsibility

- Two possibilities:
  1. Do not send more than your downstream neighbors do (RFC 2892)
  2. Inhibit sending in order to empty (shrink) your downstream neighbors passthru buffers

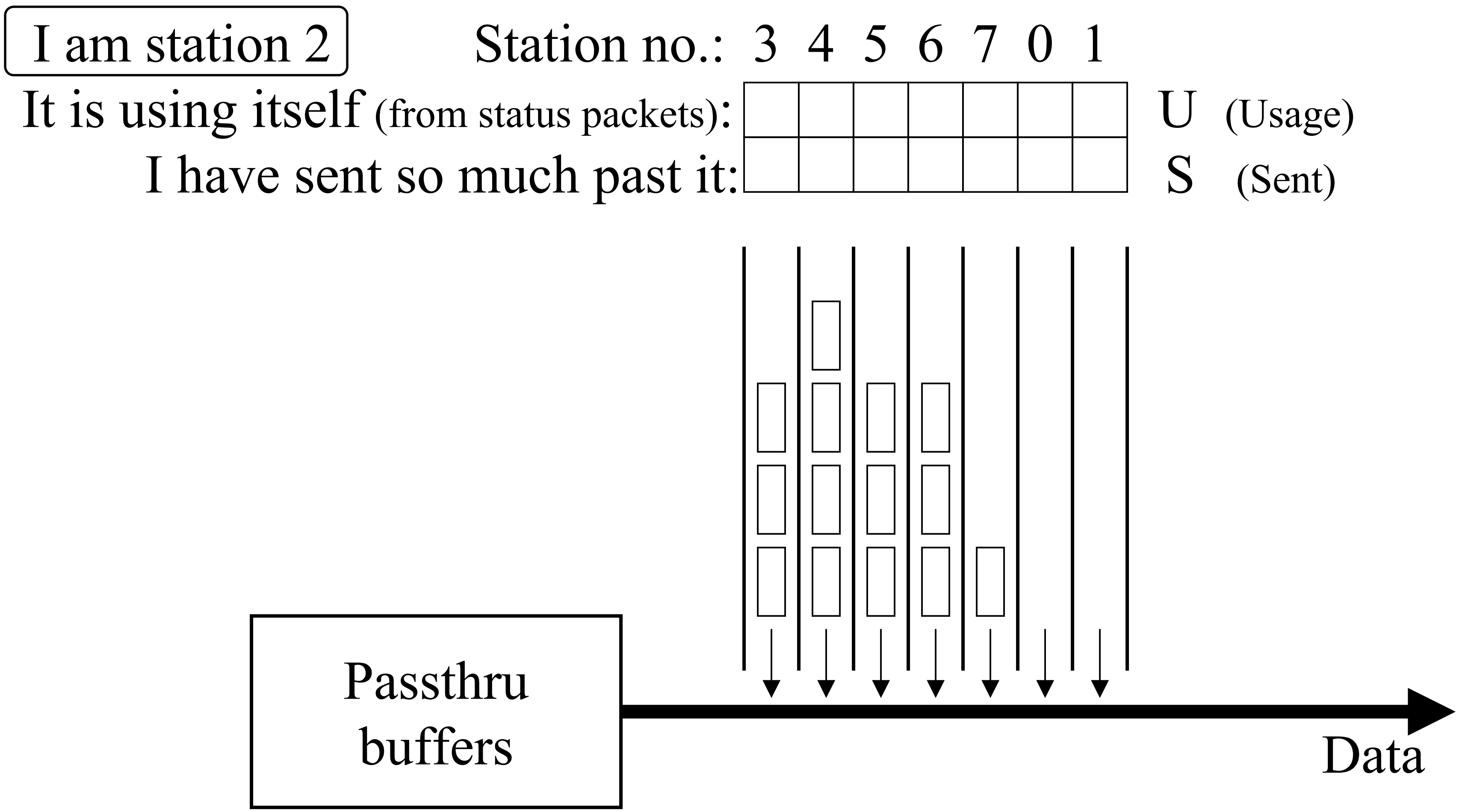
- I have made an implementation of 1

  (using low pass filters and "usage values" as in RFC 2892)

Implementation details: Status is: How much I have sent lately



2(N-1) counters in each station



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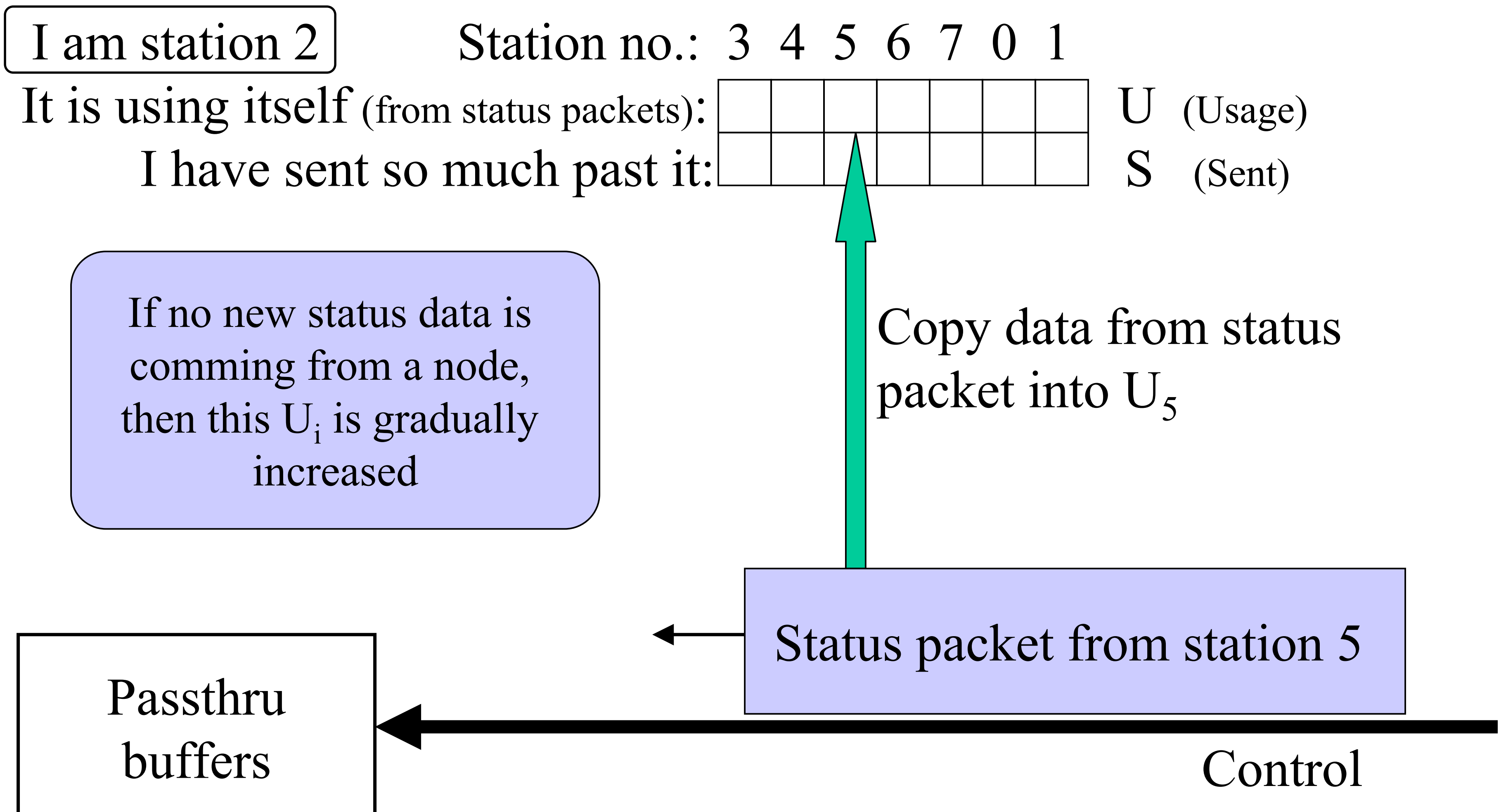


Send order

1. From high prio. passthru buffer
2. From high prio. ingress buffer
3. If low prio. passthru buffer below threshold:
   - Half and half from low prio. ingress and low prio. passthru buffers
4. If low prio. passthru buffer above threshold:
   - From low prio passthru buffer

5. Must regulate high prio. traffic so that low prio. passthru buffers never overflow !

(or have a high threshold after which passthru has absolute priority)

I am station 2

If I want to send to station 6:

Station no.:	3	4	5	6	7	0	1		
It is using itself (from status packets):								U	(Usage)
I have sent so much past it lately:								S	(Sent)

For all i = 3, 4, 5:

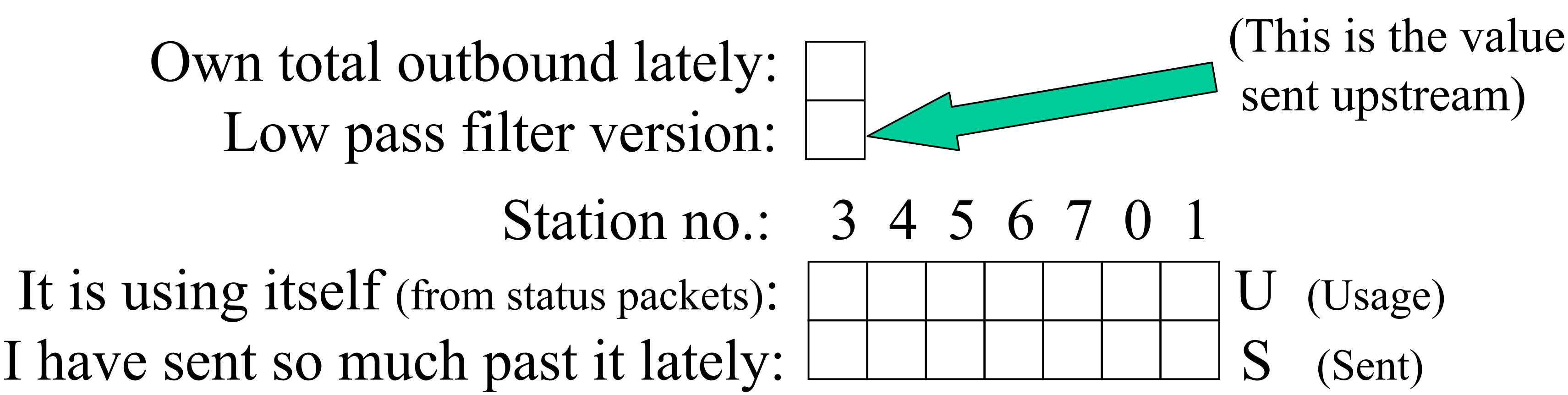
if $(S_i > U_i)$: do not send

In words:

For every segment along the path: If I have used more of this segment than the ”owner”, I may not send.

I was allowed to send to station 6:

- Update own total outbound traffic rate as well as S_3, S_4 and S_5 with how much was sent.



Conclusion (and further work)

- Solves HOL Blocking problem
- Perfect bandwidt allocation
- Simple algorithm
  - Few counters
  - Small control packets
    - Alternatively: larger packet(s) that circle the ring
- Can be extended / changed to cater for reduction of downstream passthru buffers instead
  - Downstream stations send ”Don’t-send-past-me” control packets (depending on size of passthru buffer). If all upstream stations don’t send past me for a while, then my passthru buffer gets reduced/emptied.

Performance and Questions

- P in performance session
- Q now