XCP: The eXplicit Control Protocol

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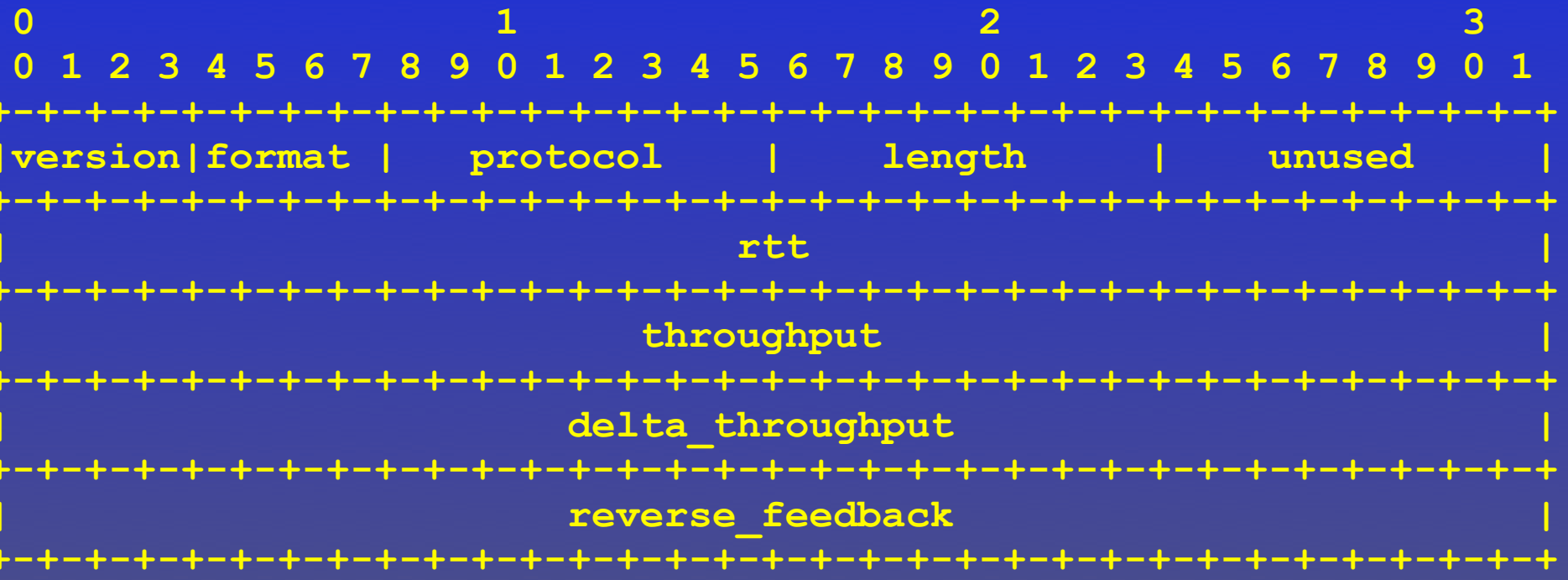
XCP in a Nutshell

- XCP is a new congestion control protocol developed by Dina Katabi, MIT
- End-systems use explicit signaling to tell routers their preferred send rate

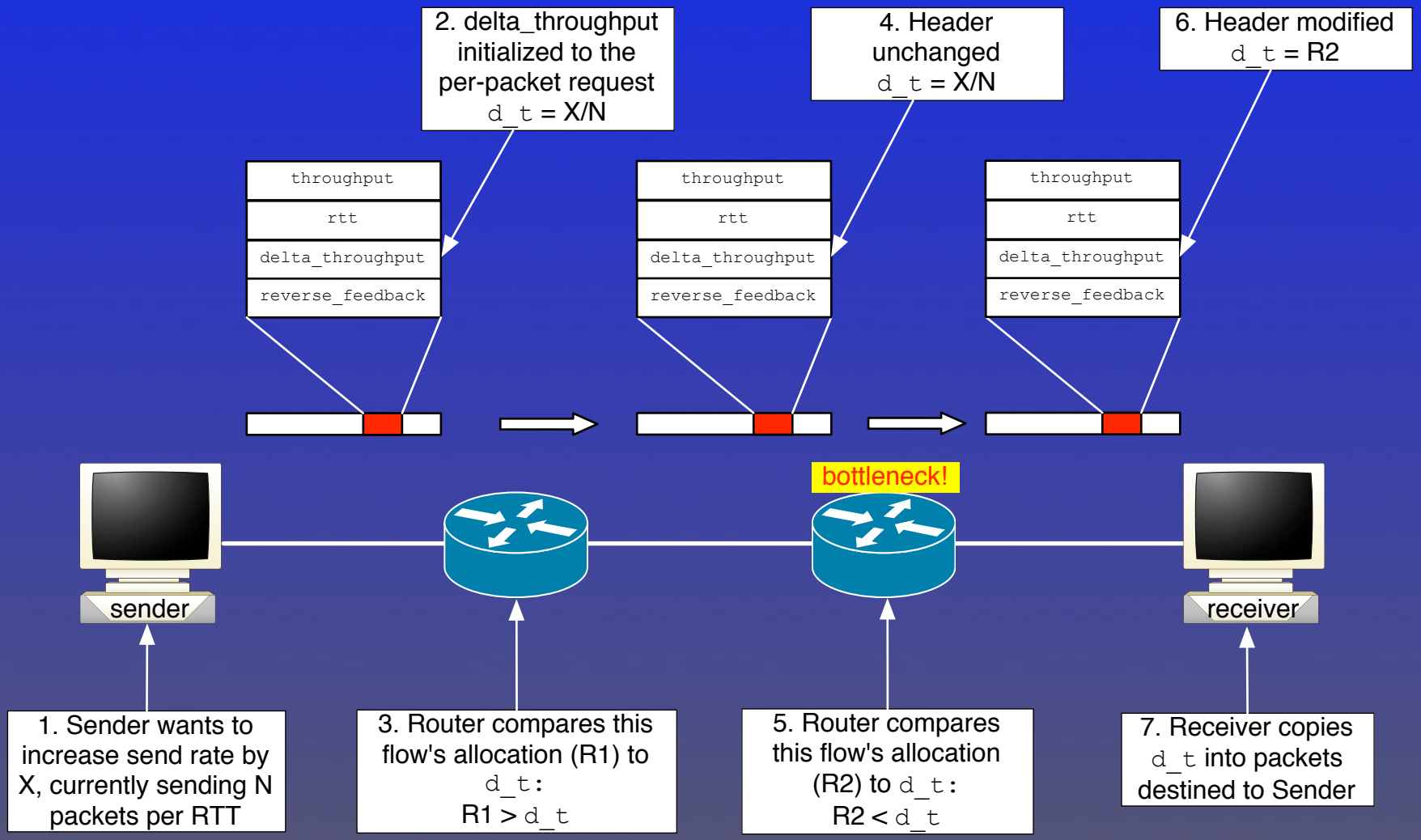
XCP in a Nutshell

- With XCP, routers...
  - ...make a per-flow allocation (without keeping per-flow state),
  - ...inspect incoming packets, and
  - ...reduce the throughput request to match the allocation (if necessary)

Explicit signaling happens via the congestion header



XCP Feedback Loop



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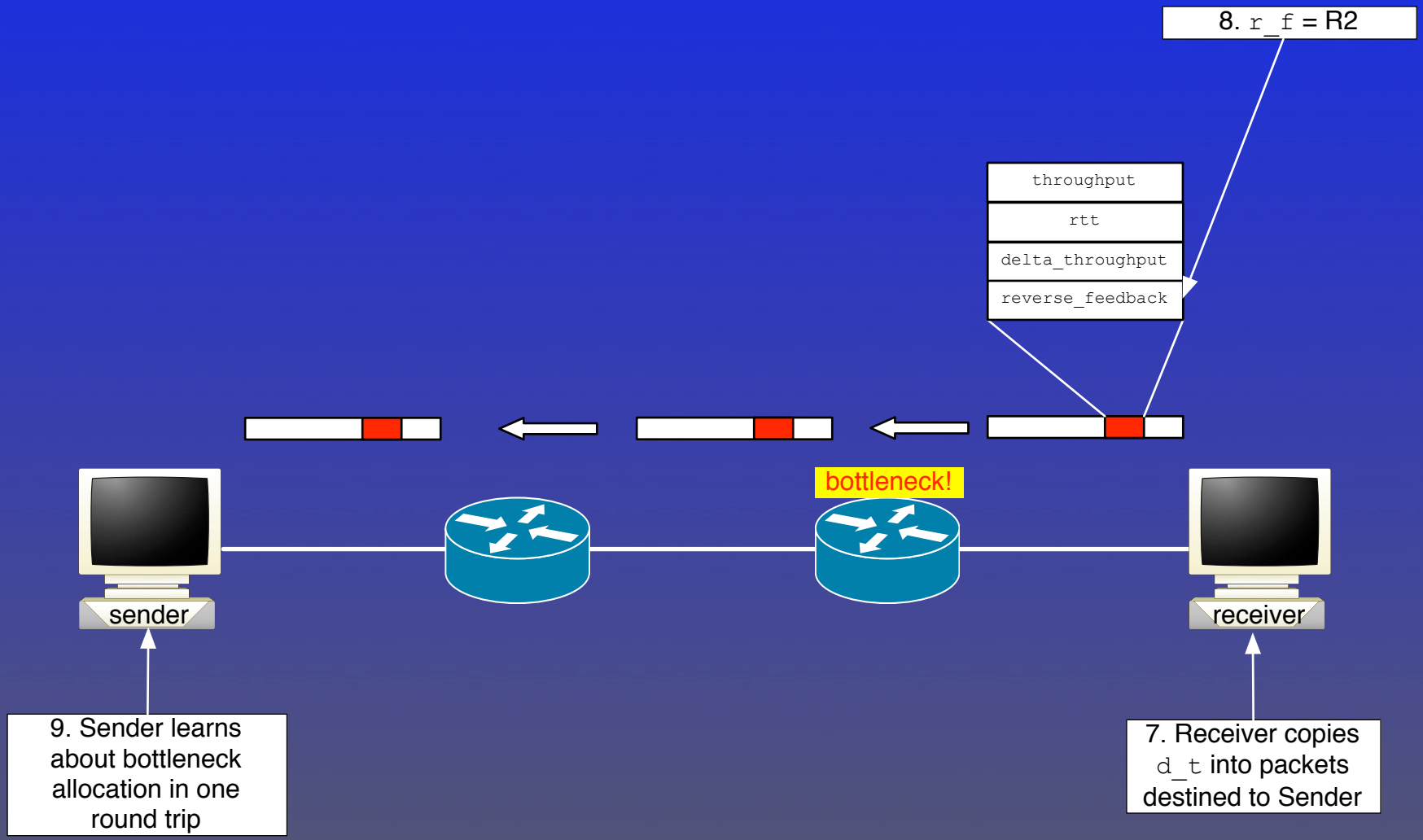
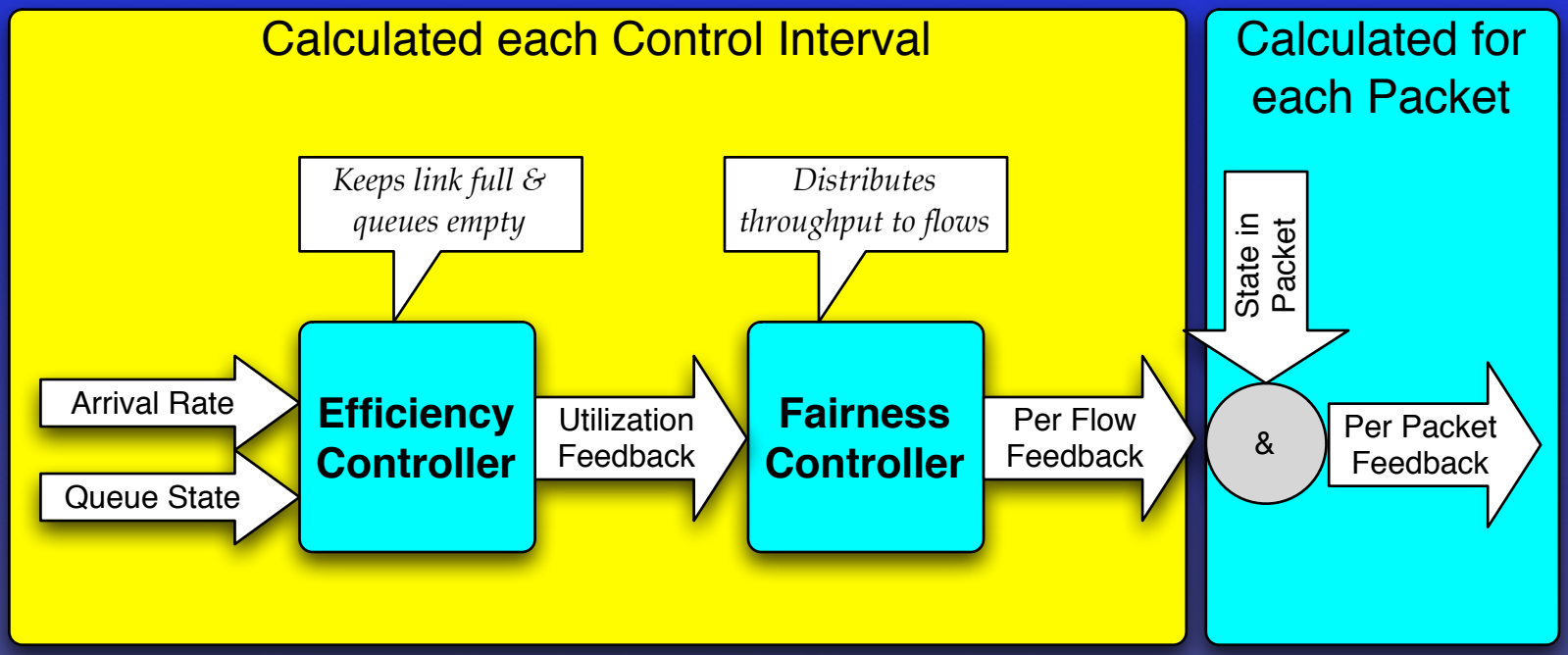
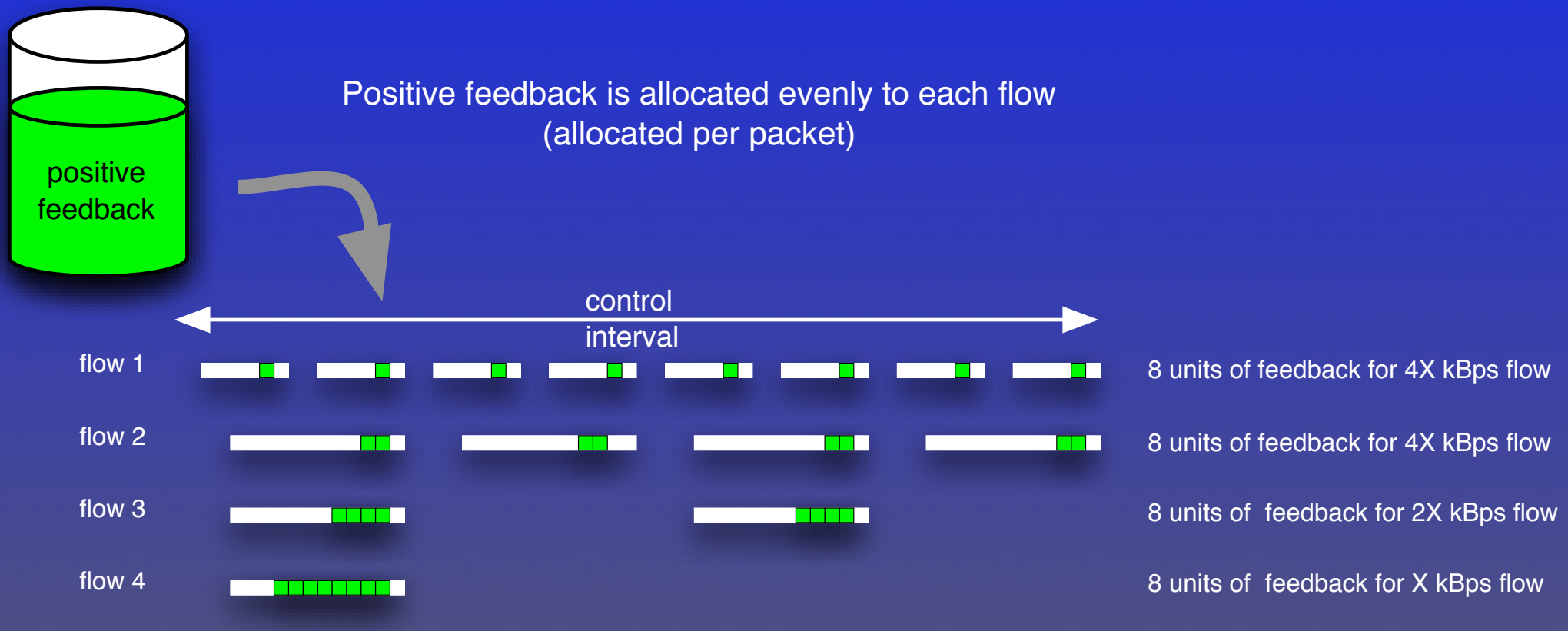


XCP Routers Run Two Independent Controllers



An instance of these controllers operate on each output queue in a router.

Router feedback is allocated to flows using AIMD



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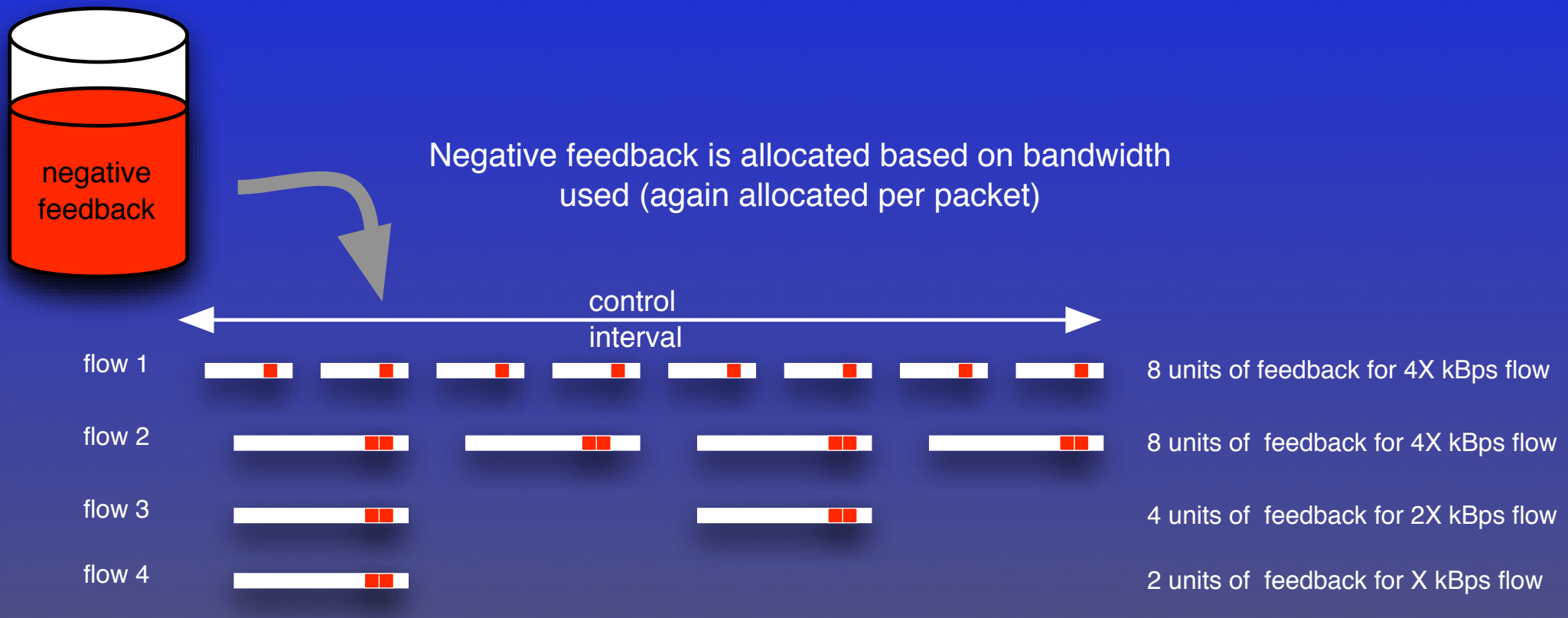

What's So Cool About XCP?

- Relative to Reno, XCP simulations show it...
  - Fills the bottleneck pipe much more rapidly
  - Rapidly converges to fairness
  - Gets better bottleneck link utilization for large BDP flows
  - Maintains tiny queues
  - Is more stable at long RTTs

What's So Cool About XCP?

- XCP is a general resource managment framework capable of:
  - Unfair allocations (e.g., QoS, low priority)
  - CC for other protocols (e.g., dccp)

Current Development

- Fair capacity sharing with TCP
- Moving line-rate divisions out of routers
- XCP PEP
- Detecting congestion at non-XCP queues

Plans

- Revise draft-falk-xcp-spec and publish as an Experimental RFC

XCP Project Info

- http://www.isi.edu/isi-xcp
  - experimental results
  - source code
  - draft specification
  - mailing list information
  - .....and much, much more!!

The End