

# **Resilient Cycle Queuing and Forwarding**

draft-liu-detnet-rcqf-00

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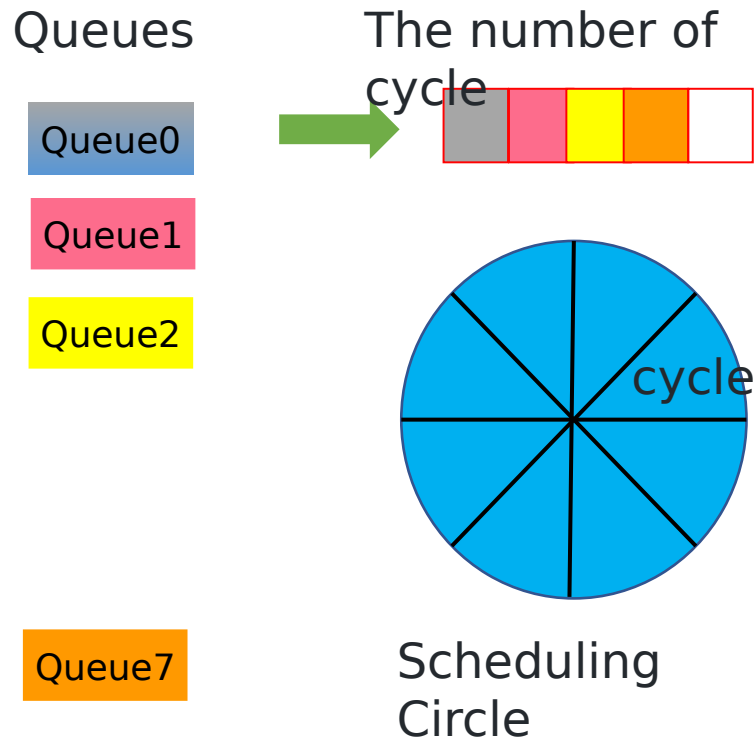
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# What is RCQF

- RCQF is a technological advancement built upon Cycle Queuing and Forwarding (CQF), designed to provide a capability for the delivery of end-to-end DetNet flows.
- RCQF extends the capabilities of CQF and makes it suitable for large scaling networks.
- Flexible definition of parameters such as the number of queues, queue length, and cycle period width. It is more friendly to control plane resource planning, topology, and traffic changes.
- Dynamic load balance between queues: Achieve smooth output when the queue are uneven, providing shaping and load balance effects.
- RCQF first proposed the Cycle-level sharing scheme, which has higher forwarding efficiency and resource utilization.

# Flexible definition of parameters



one sector represents one cycle (time slot) which can schedule the queue. All the cycles make up a scheduling circle. For example, if the scheduling circle is divided into 8 parts, then there will be 8 cycles. If the width of a single cycle is 10 microseconds, then one complete rotation of the scheduling circle will take 80 microseconds. By increasing the number of queues and sectors, different flows can be mapped to different queues to better support a greater<sup>3</sup>

# Dynamic load balance between queues

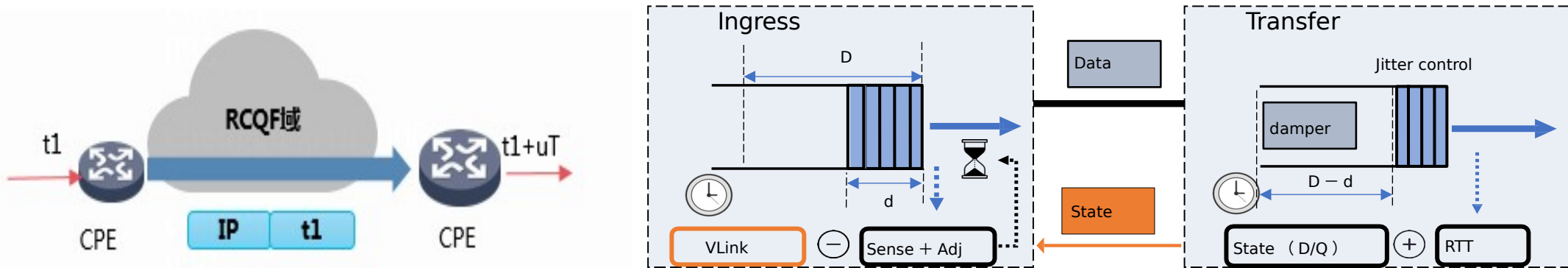


For example, the threshold value can be set as 50% of the maximum capacity of a single cycle for forwarding. When the threshold is exceeded, the sharing of scheduling between adjacent queues is performed.

By adjusting and optimizing the above methods such as thresholds, sharing, forward and backward shifting, and step size, it is possible to achieve queue shaping, sharing between queues, and smoother output of packets, thereby improving overall forwarding efficiency and resource utilization.

RCQF's sharing processing occurs during the cycle scheduling period, rather than during the queue entry period.

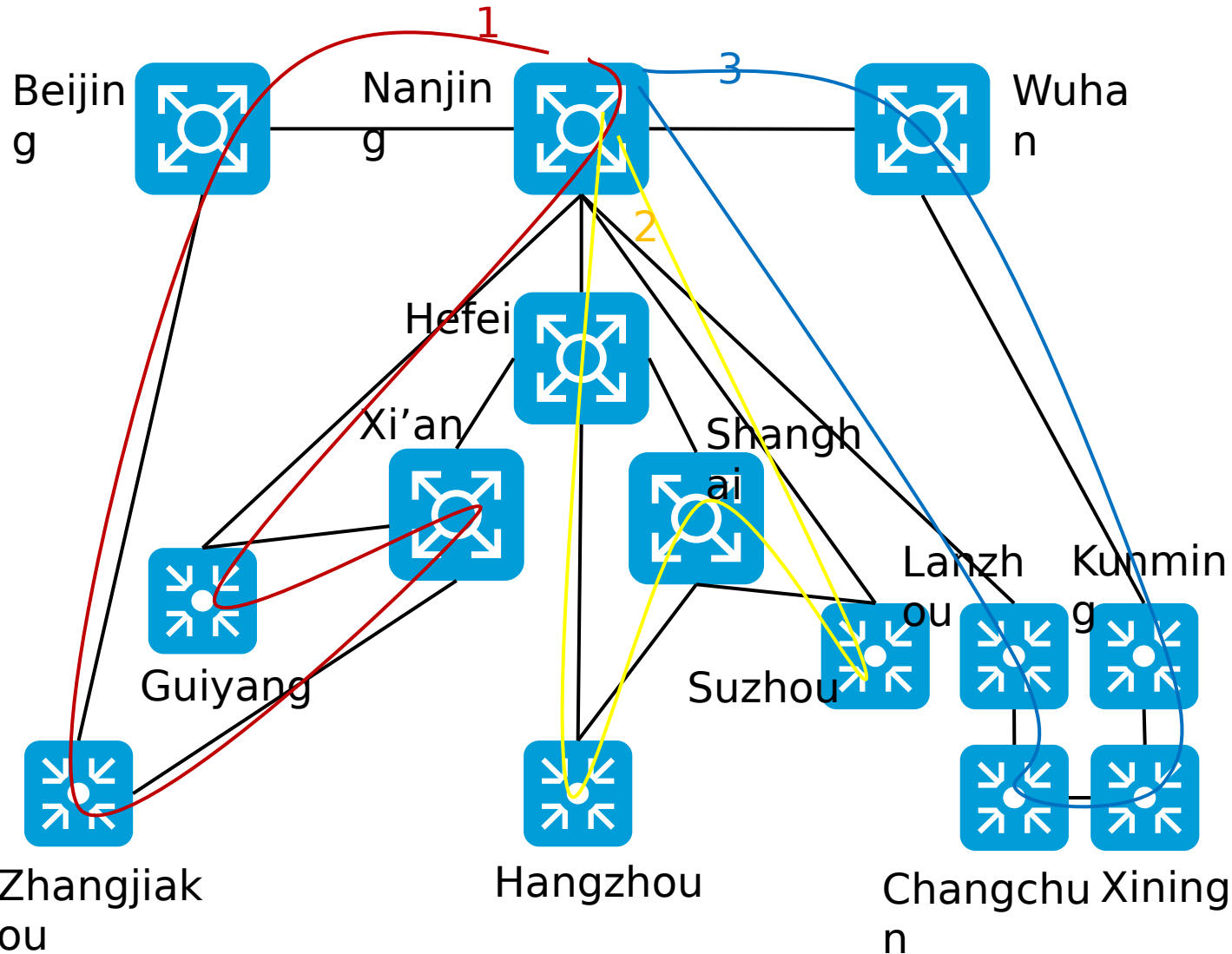
# Jitter damper



[I-D.guo-detnet-jitter-reduction-mechanism] describes a compensation mechanism designed to reduce end-to-end jitter and meet the requirements of applications with tightly bounded jitter. The compensation mechanism can be a part of RCQF and could achieve on time.

<https://datatracker.ietf.org/doc/draft-guo-detnet-jitter-reduction-mechanism/>

# CENI tested deterministic performance



With a mix of variable-sized deterministic and fixed-sized non-deterministic traffic, deterministic traffic had an average jitter of **<10us** and max jitter of **18us**, while non-deterministic had ~90us average and >110us max jitter.

On the Nanjing-Wuhan-Nanjing path with overload (75Gbps deterministic + 25Gbps non-deterministic), deterministic traffic **showed no packet loss with ~10us average jitter and 19.8us max jitter**. Non-deterministic traffic experienced packet loss and had 12ms average jitter and 85ms max

# Next step

- **Feedback / collaboration highly welcome!**

**Thank you!**