Queuing Disciplines for Bandwidth Management

Queues and Queueing

- queueing we determine the way in which data is *SENT*.
- we can only shape data that we transmit.

classless Queueing

- Classless queueing disciplines are those that, by and large accept data and only reschedule, delay or drop it.
- These can be used to shape traffic for an entire interface, without any subdivisions.

Queuing mechanisms

- FIFO, First In First Out
- Packets arrive and leave the queue in exactly the same order
- Simple configuration and fast operation
- No Priority servicing or bandwidth guarantees possible

- WFQ, Weighted Fair Queuing
- A hashing algorithm, places flows into separate queues where weights are used to determine how many packets are serviced at a time. You define weights by setting IP Precedence and DSCP values.
- Simple configuration.
- No priority servicing or bandwidth guarantees possible.

Queuing mechanisms (2)

- CQ, Custom Queuing
- Traffic is classified into multiple queues with configurable queue limits.
- Has been available for a few years and allows approximate bandwidth allocation for different queues.
- No priority servicing possible. Bandwidth guarantees are approximate and there are a limited number of queues. Configuration is relatively difficult.

- PQ, Priority Queuing
- Traffic is classified into high, medium, normal and low priority traffic is serviced first, then medium priority traffic, followed by normal and low priority traffic.
- Has been available for a few years and provides priority servicing.
- Higher priority traffic can starve lower priority queues of bandwidth. No bandwidth guarantees possible.

Queuing mechanisms (3)

- CBWFQ, Class Based Weighted Fair Queuing
- MQC is used to classify traffic. Classified traffic is placed into reserved bandwidth queues or a default unreserved queue.
- Similar to LLQ except there is no priority queue. Simple configuration and ability to provide bandwidth guarantees. No priority servicing possible.

- PQ-WFQ, Priority queue-Weighted Fair Queuing (IP RTP Priority)
- Single interface command is used to provide priority servicing to all UDP packets destined to even port numbers within a specific range.
- Simple, one command config. Provides priority servicing to RTP packets.
- All other traffic is treated with WFQ. RTCP traffic is not prioritized. No guaranteed bandwidth capability.

- Note: MQC = Modular QoS CLI

Queuing mechanisms (4)

- Low Latency Queueing (LLQ) = Priority Queue (PQ)+ Class Based-Weighted Fair Queue (CB-WFQ).
- Allows a strict Priority Queue to handle a defined class of packet to be prioritized over all other traffic.
- Simple config, ability to provide priority to multiple classes of traffic and give upper bounds on priority bandwidth utilization. Can also config bandwidth guaranteed classes and a default class.
- All priority traffic is sent throught the same priority queue which can introduce jitter.