



Buffering Walkthrough for IP Broadcast Traffic

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Agenda

- Introduction - What is buffer?
- Buffer Architecture – VOQ and Egress buffer
- How buffer is used by unicast and multicast?
- How buffering affects my broadcast traffic?
- Implement QOS to protect broadcast traffic

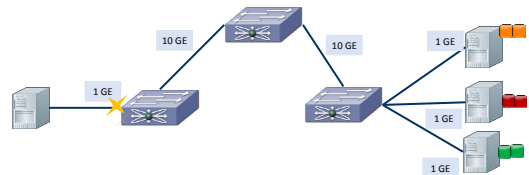
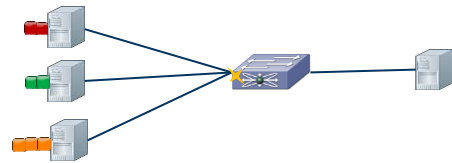


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Buffer

- Buffers on an ethernet switch
 - Traffic is sent from ingress to egress interface
 - It momentarily sits in buffer until it is scheduled to leave the egress interface
- When do buffers come into play
 - Speed Conversion
 - Traffic Bursts
 - Many to one communication

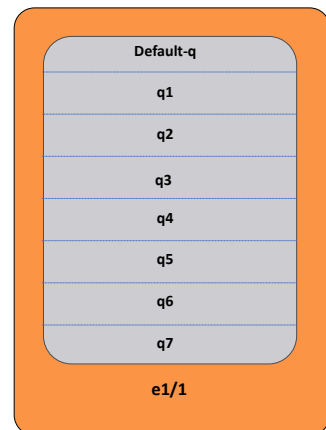


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Queuing and Scheduling

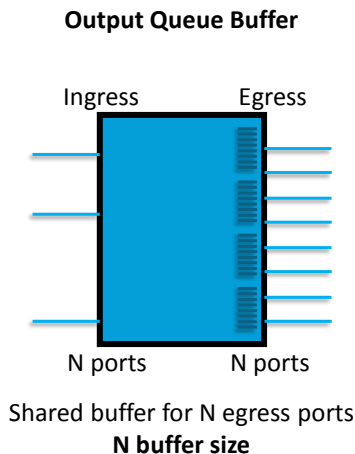
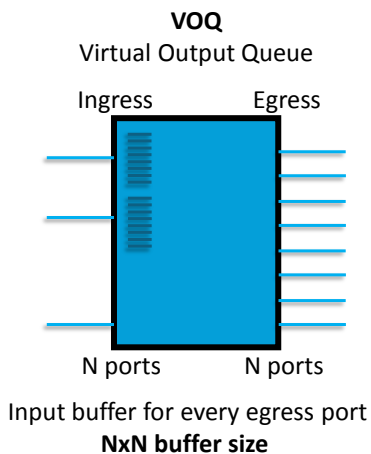
- Queueing is logical operation separation traffic in buffer
- Scheduling is operation dequeuing traffic from a queue
- Queues are scheduled based on algorithm
- Some queues have scheduling priority over others
 - Strict priority queue
 - Regular queues



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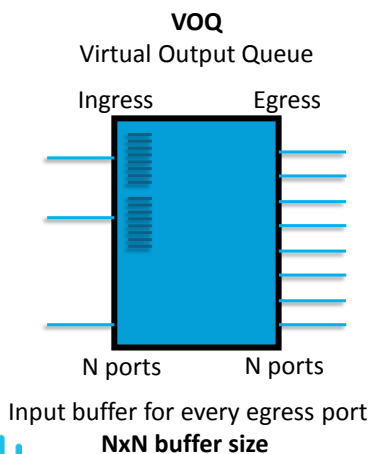
Buffer types



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VOQ Buffer



- Majority (~90-98%) of buffer is attached to ingress ports (~2-10%), minor shared buffer is used by egress ports
- Suitable for large external buffer architecture (Big buffer switches)
- Ingress buffer is divided in Virtual Output Queues to simulate egress buffer and prevent Head of Line Blocking (HOLB)
- **Unicast traffic (most file based workflow) uses ingress large buffer**
- **Multicast traffic (most LIVE workflow) uses egress shared buffers (smaller)**

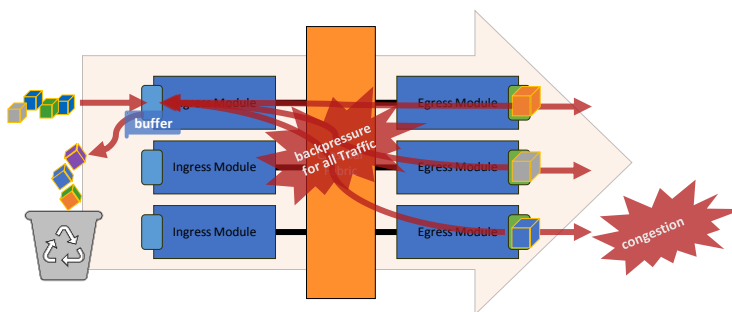


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Ingress buffering for Broadcast traffic – Head of Line Blocking

- SMTP 2022-6, SMTP 2110, SMTP 2059 may be affected by HoLB that will affect multiple streams.

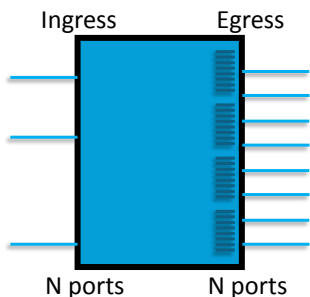


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Output Queue Buffer

Output Queue Buffer



Shared buffer for N egress ports
N buffer size

- Buffer is shared between egress ports, for both unicast and multicast traffic
- Dynamic buffer allocation to ports under congestion
- As every port has a N queues, no HoLB for unicast nor multicast
- Suitable for on chip buffer architecture

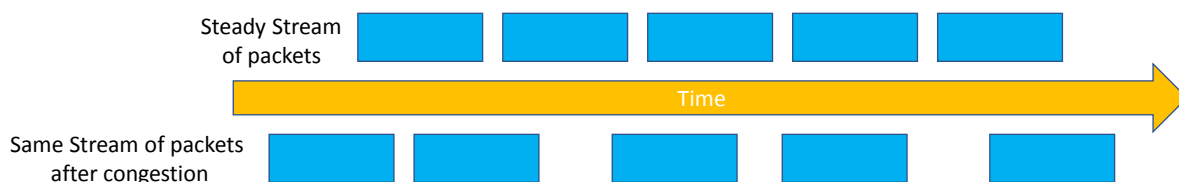


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Buffers and Broadcast traffic - Jitter

- SMTP 2022-6, SMTP 2110, SMTP 2059 are multicast traffic streams
 - Requiring low latency and low jitter (jitter - change in latency)
- Jitter can be results of traffic buffering, where packets are delayed because of congestion



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How much buffer is needed?

- Real time traffic should be forwarded immediately, without buffering for a long period that impacts latency and causes jitter
- A switch must have sufficient buffers to absorb burst of an application
- Dynamically shared buffer architecture, allows flexible use of buffer during burst and congestion, to provide optimal results
 - Queue-limit may be applied to ensure a single flow does not consume more than its fair share of buffers



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Quality of Service

- Quality of Service can protect sensitive broadcast traffic
- Live production traffic can take strict priority queue or high priority queue
 - Strict priority queue/high priority queue will protect sensitive traffic by dequeuing it first and keeping latency and jitter minimal
- File based workflows can co-exist in the network, should take lower priority queue



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Conclusion

- Multicast Traffic does not use Ingress Buffers to avoid HoLB
- ST2110 Traffic must be placed in high priority queue which is scheduled before any other traffic which avoids latency/jitter
- Other traffic (file based) is placed in a lower priority queue
- Proper QoS design ensures LIVE traffic is never impacted due to any congestion introduced by any other traffic



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