

# **Class Based Flow Control**

## **A Necessary Requirement for Congestion Management**

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# List of Supporters

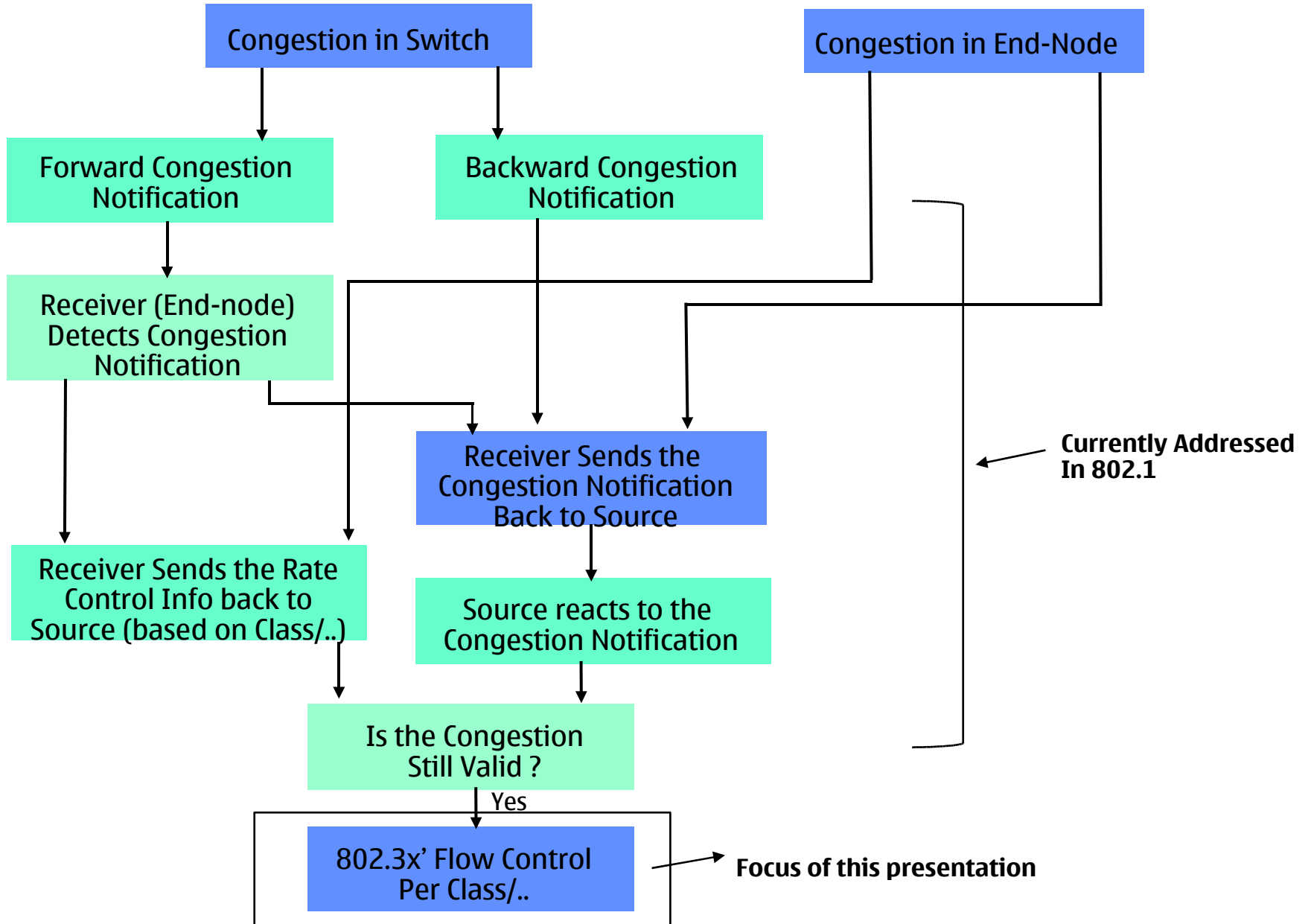
- Robert Brunner, Ericsson
- Aniruddha Kundu, Intel
- Manoj Wadekar, Intel
- Jeff Wise, Motorola

# Ethernet as a Backplane Transport

(focus on Congestion Management)

- Primary goal is to utilize Ethernet as a silicon-to-silicon inter-connect, with cross-bar like functionality
- Packets should not be discarded in the switching sub-system.
  - Intelligence on the edge
- Rate mis-match between the blades, as well as multi-chassis situation should be considered
- Congestion Management implementations should be in Hardware to maintain low latency
  - Software involvement for configuration and monitoring purpose only
- CM mechanism should support multiple priority classes
- Proposed solution should accommodate asymmetric traffic
- Switching happens at L2, and is agnostic of L3-L7 protocols
  - TCP and even IP are not always present in telecom traffic
- End to End CM (FCN or BCN) is necessary
  - BUT still does not guarantee “No Packet Drop”
  - Hence, complete CM mechanism should support multiple priority classes

# Congestion Management

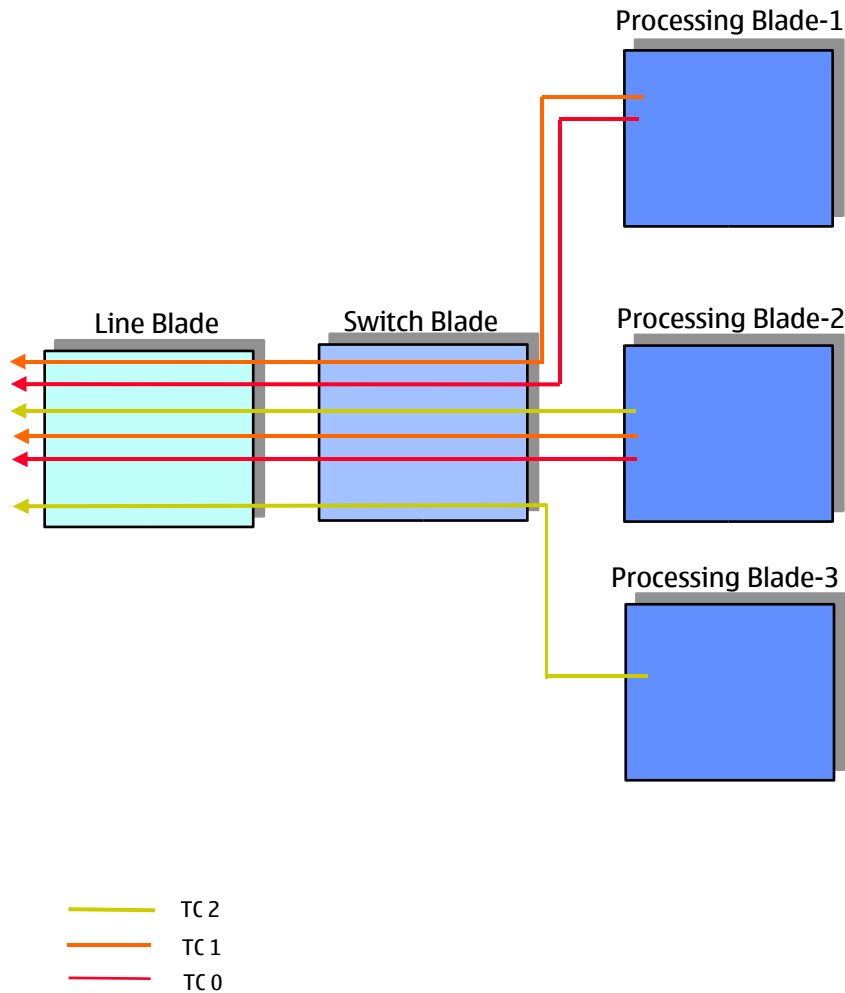




# Flow Control Improvements

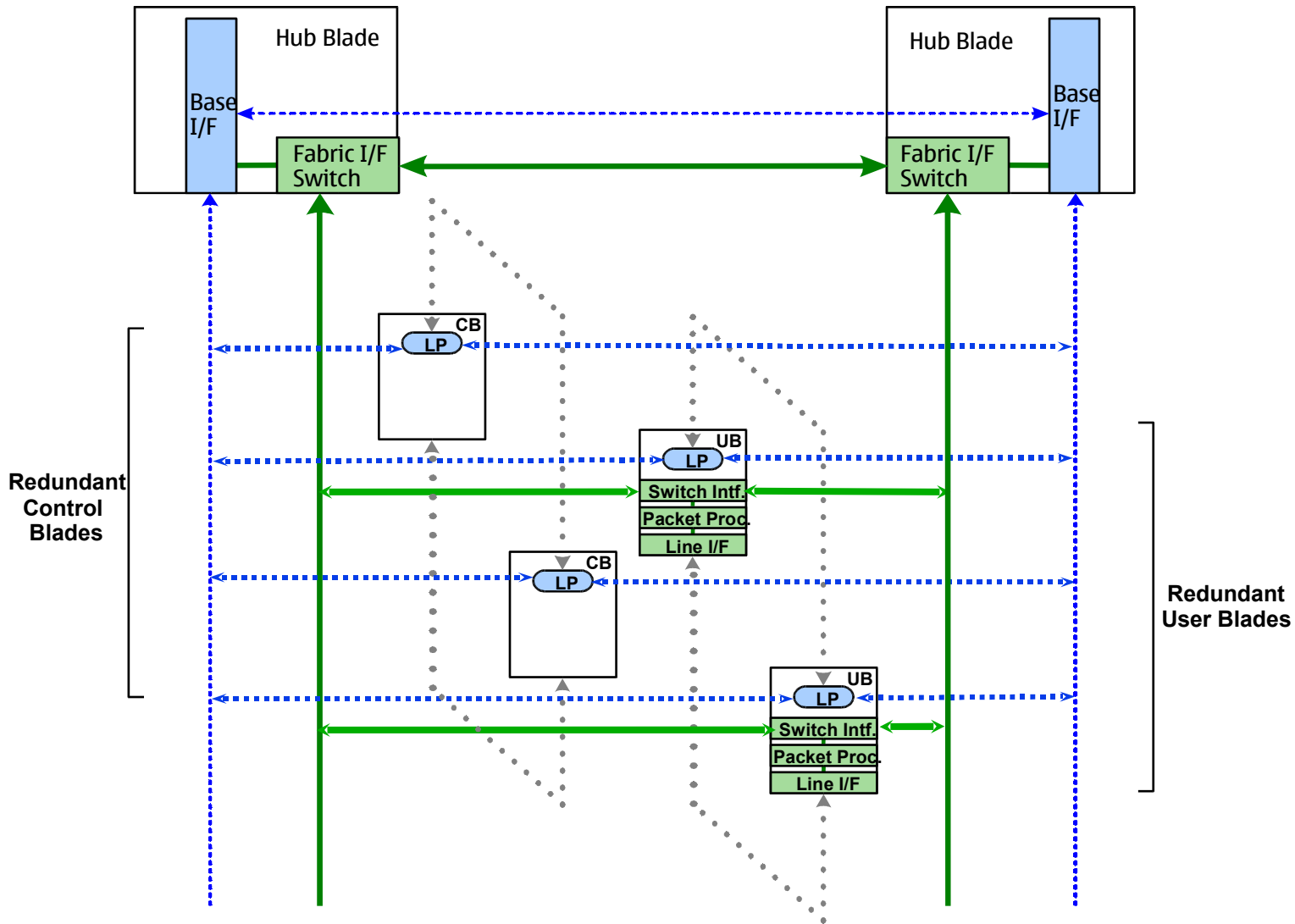
- Flow Control is necessary to avoid packet loss in the Switches
- XON/XOFF protocol provides simplicity but
  - Increases latency and Jitter
  - Decreases throughput
  - Causes congestion to spread across traffic classes
- There is a need to expand the 802.3x flow control to provide at least the class-based information back to the source.
  - Overcomes HOL blocking, and enables guaranteed QoS for high priority traffic
  - Prevents congestion in one traffic class from spreading to higher priority traffic classes

# QoS support using Class Based Flow Control



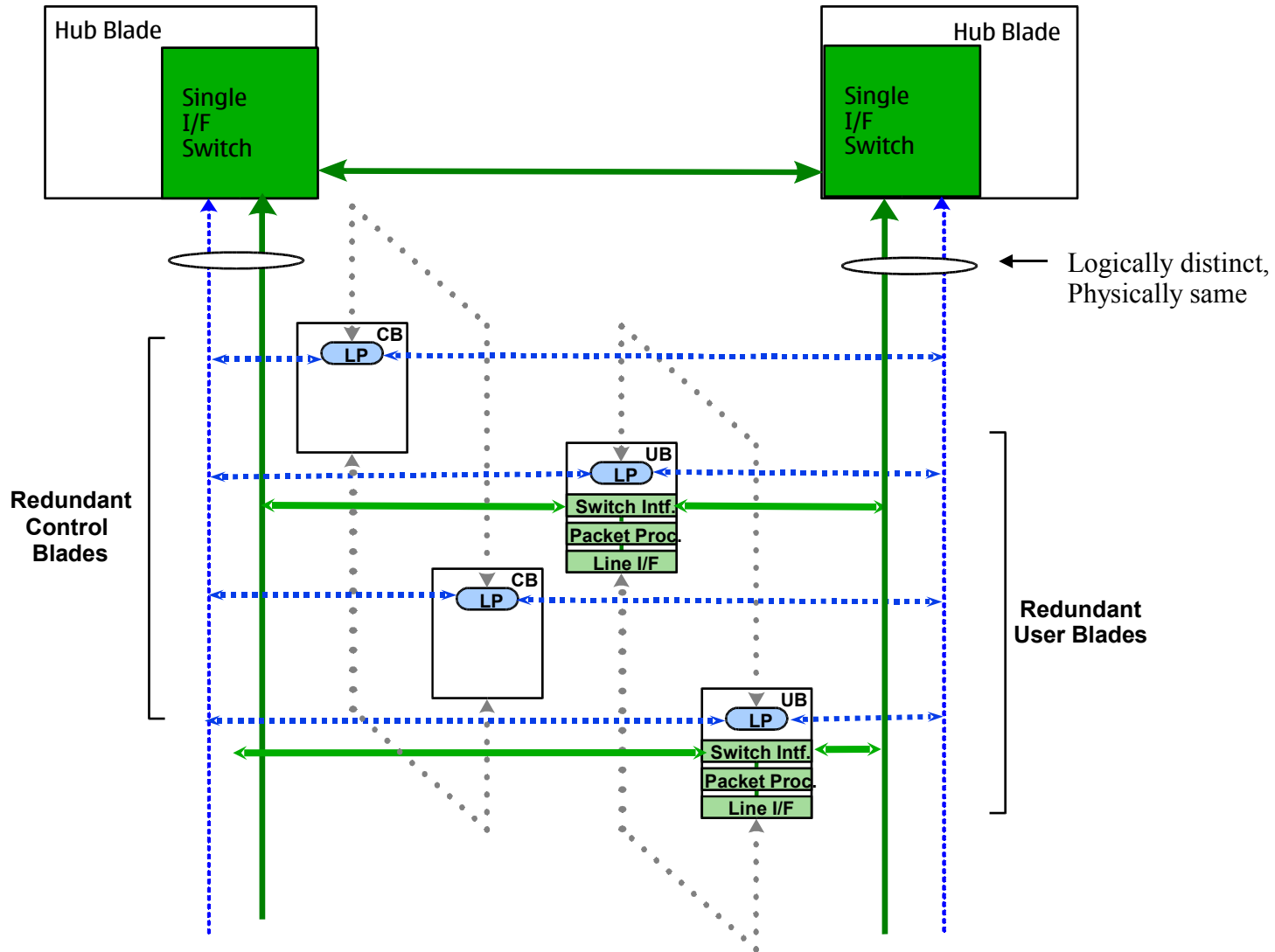
- Traffic flowing from multiple processing blades to single line card
  - Multiple traffic classes
- Case 1: High Priority traffic with low bandwidth requirement
  - Class based flow control will allow high priority traffic to pass without HOL even in case of congestion in lower priority traffic classes
- Case 2: High Priority with high bandwidth requirement
  - Rate Limiting or other traffic engineering mechanism at end-nodes, along with class based flow control will allow for the correct treatment of High Priority traffic

# Separate User and Control Paths using Separate Switch Fabric





# Separate User and Control Paths using Single Fabric



# Summary

- Class Based Flow Control is a necessary requirement for congestion management in a chassis based system using Ethernet Switches
  - Allows Traffic Differentiation
  - Avoids HOL
  - Enables guaranteed bandwidth support for High Priority Traffic
- Finer Flow Control mechanism enables low cost, and simpler system solutions
  - Example: In the ATCA platform, the user and control plane can be implemented using Fabric Interface
- Class Based Flow Control is a step towards the wider congestion management mechanism, and is an attempt to address part of the Objective 1 of 802.3ar PAR