Reduction of Impacts of Legacy Traffic on Stream Latency

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Reduction of impacts of legacy Traffic

Options to reduce effects of long frames

2. Interrupt long legacy Frames
3. Make long Frames smaller

...Fragmentation! On demand or by default?

Assumptions:
- Store and Forward principle for non stream
- Only small changes in architecture required
- Maintain basic framing rules (min Frame, IFG...)

Diagram:
- Control frame arrived
- Legacy frame in tx
- Before control frame get a chance of tx, legacy frame tx must be finished
- Legacy frame interrupted, control frame start tx, later legacy frame is re-transmitted (not a good idea!)
- Legacy frame in tx, control frame arrived, legacy frame interrupted, control frame get tx, after it finishes rest of the legacy frame get tx
- Fixed size fragments of legacy frame in tx, control frame get tx after the current in service fragment
Fragmentation Protocol considerations

• Both options (2a, 2b) should use same infrastructure
  • Same fragmentation encoding
  • Dissassembly independant from fragmentation policy
  • Reassemble on ingress side operates in the same way

• Must we change some thing in side the MAC?
  • Interruption mechanism (On demand fragmentation)
    • some changes in IEEE802.3 (and others?) needed
  • Fixed Fragmentation
    • restrict max frame size at a link
    • fragmentation at egress and reassembly at ingress
      without change of MAC function?
    • cost more overhead
Codeing for frag tag (discussion)

- Fragmentation tag
- Length of frame in the first fragment
  - the end of the frame is known in advance
- Fragment Number or Frame Offset
  - Missing Fragments can be detected
- Frame number
  - Needed for a 2 fragment loss in case of a error burst
- Error field to cancel fragmentation?
  - Useful to reset the sender or signal fragmentation
- Length of fragment?
  - Not needed! Problem with the interruption approach
- Open issue: how to set Addresses
  - Use special MAC addresses and code the original ones later?
  - Keep frame addresses

=> Optimized coding to save bandwidth and minimize overhead
Example fragmentation

- Min Frame size: if residual fragment <46 upgrade last fragment to 46
- Additional padding octets are also possible but this will waste bandwidth
- The min Frame Size requirement will lead to 92 octets minimal Frames with Delays in the same order
Zero legacy frame interference Latency?

- Problem Statement
  - Fragmentation can reduce the impact by an order of magnitude
  - Smart stream management with look ahead can improve this further
  - Interruption technology (fragmentation on demand) can reduce fragmentation overhead but not latency

- Possible Solution
  - Use fixed time slots for RT traffic and stop legacy traffic before
  - Zero impact of legacy frames
  - Needs knowledge of the timing from talker to listener
  - Only work with homogenous networks, and need synchronized bridges/ no legacy bridges
  - High configuration effort
  - … both concepts can be combined
Queueing effects

• Problem Statement
  • Queueing delays can increase latency for some streams
  • Timing of the minimal latency streaming requires an efficient stream burst processing
  • Ordering and timing needed to minimize latency!!

• Possible Solutions
  • Smart protocols for topology detection in combination with MSRP
  • Engineered approach: timing information given to senders and bridges
  • Or both...
Thank you!