Interspersion of Express Traffic

Technical Proposal for a Wire Compliant Solution

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Design Rules:

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Thompson Proposal Design Rules for"
"Interspersing Express Traffic"
(Proposed for consensus w/i DMLT SG)

1. No padding in any fragments produced by our process
2. All packets on the wire must be "legal" Ethernet packets
      a. Max Length not an issue here
      b. Segmentation packets will have locally valid CRC
      c. Segmentation packets will not have padding added
3. All packets entering the Bridge Relay Sub-Layer must be "legal"
Ethernet packets.

1 & 2c Result in poorer performance (i.e. higher worst case latency)
     therefore are open for discussion.
THIS AREA DESERVES SIGNIFICANT DISCUSSION
HIGH IMPACT ON BEST POSSIBLE PERFORMANCE

Proposal (1):

Method to "distinguish traffic" at transmit
end will be two transmit bridge ports
- One for Normal traffic
- One for Distinguished/Express traffic
Method to "distinguish traffic" at receiver
- All "normal" traffic will have:
- VLAN method TAG and
- IET EtherType in that TAG
Express Traffic requires EtherType (No LLC)
- EtherType ≠ IET type value

Prefer to have TAG added at transmit Bridge Relay

Proposal (2):

All "Express Traffic" will:
   - NOT have IET EtherType

All "Non-Express Traffic" (unsegmented) will:
   - Have TAG with IET-1 EtherType

All "Non-Express Traffic" segments
   (i.e. "following segments")
   - Will have TAG with IET-2 EtherType

IET-1 TAG added at transmit Bridge Relay
IET-2 TAG inserted at segmentation sub-layer

Proposal (3):

RECEIVE SIDE

- Only 1 receive MAC/Bridge Port necessary,
  could be 2 for symmetry.
- Major design decision (& cross layer issue)
  - Where to do reassembly of Segmented Packets?

See next slide

Proposal (4):

Reassembly of Received Segmented Packets

A. Reassemble below receiving MAC
- Makes process transparent at receiving MAC and its service interface
- Makes reassembled packet subject to fragmentation "down the line"
- Breaks layer model by making this a packet store & fwd layer

B. Reassemble above the receiving MAC
- In a new (Dot 3?)shim layer between MAC and Bridge Layer
- Makes process transparent at Bridge Layer interface
- Makes reassembled packet subject to fragmentation "down the line"
- Breaks layer model due to assymmetry

C. Reassemble in receiving Bridge Layer (or not)
- Doesn't have to be a port specific process
- More suitable for a software process
- EnTAG/DeTAG already a Bridge process
- Segmentation packets can be forwarded "as-is" through other bridges
    - Improves Express Traffic performance through rest of network
- Reassembly takes place (last resort) at bridge with end station port
    (or possibly even w/i "bridge process" in end station)
- Minimizes new port hardware required by std & implementation

Proposal (5):

TAG Requirements:

- Express Traffic from Bridge to MAC Transmit Port
    - NO TAGGING (No length or processing overhead to slow it)
    - Any EtherType value except IET
- Normal Unsegmented Traffic from Bridge to MAC Transmit Port
    - VLAN Type TAG
    - Identifying EtherType/Subtype (IET-1)
    - Length (for managing segmentation/reassembly)
        - If "Length" = Physical Length then it hasn't been broken up
    - Other information (TBD, should reserve some space)
- Chop Operation (i.e. Interspersion Request = Segment Operation)
    - Terminate IET-1 segment with valid CRC, Length > 46
    - VLAN Type TAG inserted in front of new segment
    - Identifying EtherType/Subtype (IET-2)
    - Local CRC flag (Redundant, implied w/ IET-2 EtherType)
        (Says this CRC is not the CRC of the reassembled packet)
    - Length (for managing segmentation/reassembly)
        - Countdown value from IET-1 Length Value
            Value must be > 46 (See slide 3)
    - Other information (TBD, should reserve some space)

Features (1):

- DML/E Traffic is "Distinguished" by virtue of <u>not</u> having a VLAN Tag of known Type value.

- All tagging/untagging overhead penalties are pushed over to the best effort traffic stream.

- Any Type value except IET is OK for Express Traffic stream.

Features (2):

- No changes to the MAC
- Packets on wire are all legal Ethernet
- Minmal changes to packet analyzers
    1 or 2 new types (1 w/ 2 sub-types)
    New TAG format w/ small # of simple fields
- No changes whatsoever to Express Traffic packets

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Features (5):

- Insertion of standard TPMR is completely benign
- Insertion of normal bridge into network only
    breaks Express Traffic aspect
- Reach of segmentation is programmable
    w/i bridge set (w/ bridge layer reassembly)
- No changes whatsoever to Express Traffic packets

Features (6):

- Minimizes time to segment for express transmit
    Calculate by LENGTH field contents
    No waiting to see length of normal packet
    No tagging/reframing delays for express traffic
    All overhead pushed to lower priority frames

Further Work:

- Presentation to date is a half baked scheme
- Needs more work (TAG format, State machines)
- Fairly complete as single hop solution
  - Allowing padding in segments would improve latency.

- Allowing multi-hop and multi-site fragmentation will add complexity.
- A multi-hop/keep things segmented across the network should improve overall network performance (i.e. more ATM like)

Discussion

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