RoE CPRI mapper strawman proposals v2

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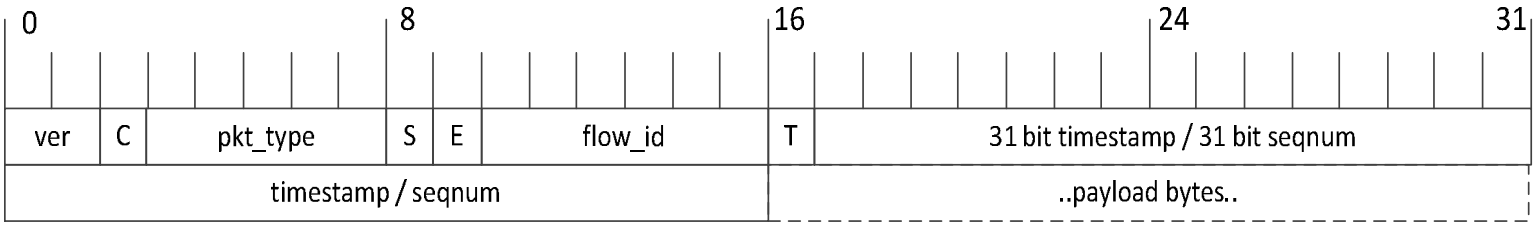
Two breeds of structure aware mappers

- The "dummy" CPRI mapper
  - Just remove the line coding.
- The "better" CPRI mapper
  - Break the CPRI (v6.1) framing into multiple RoE streams.
- Proposal: define both in the IEEE 1904.3 Specification.

The dummy structure aware mapper

- Remove the 8B/10B or 64B/66B line coding.
- Transport N Basic Frames in a RoE data packet. 256 mod N must be 0.
  - The number N negotiated during link setup.
- CPRI Control Words may be extracted and transported in a separate RoE Control stream.
- Mark the start and end of HF as well.

The dummy mapper cont'd



- Reserve a pkt_type (say 0x01).
- Payload CPRI Basic Frames after removing the 8B/10B or 64B/66B coding:
  - Use S&E flags to mark the start, mid and end frames.
- flow_id can be used to multiple individual CPRI flows between SA/DA pair.
- Either timestamps or seqnums used.
- In a case of seqnums the increment amount is to be decided during the "link setup".

Dummy mapper packetization concerns

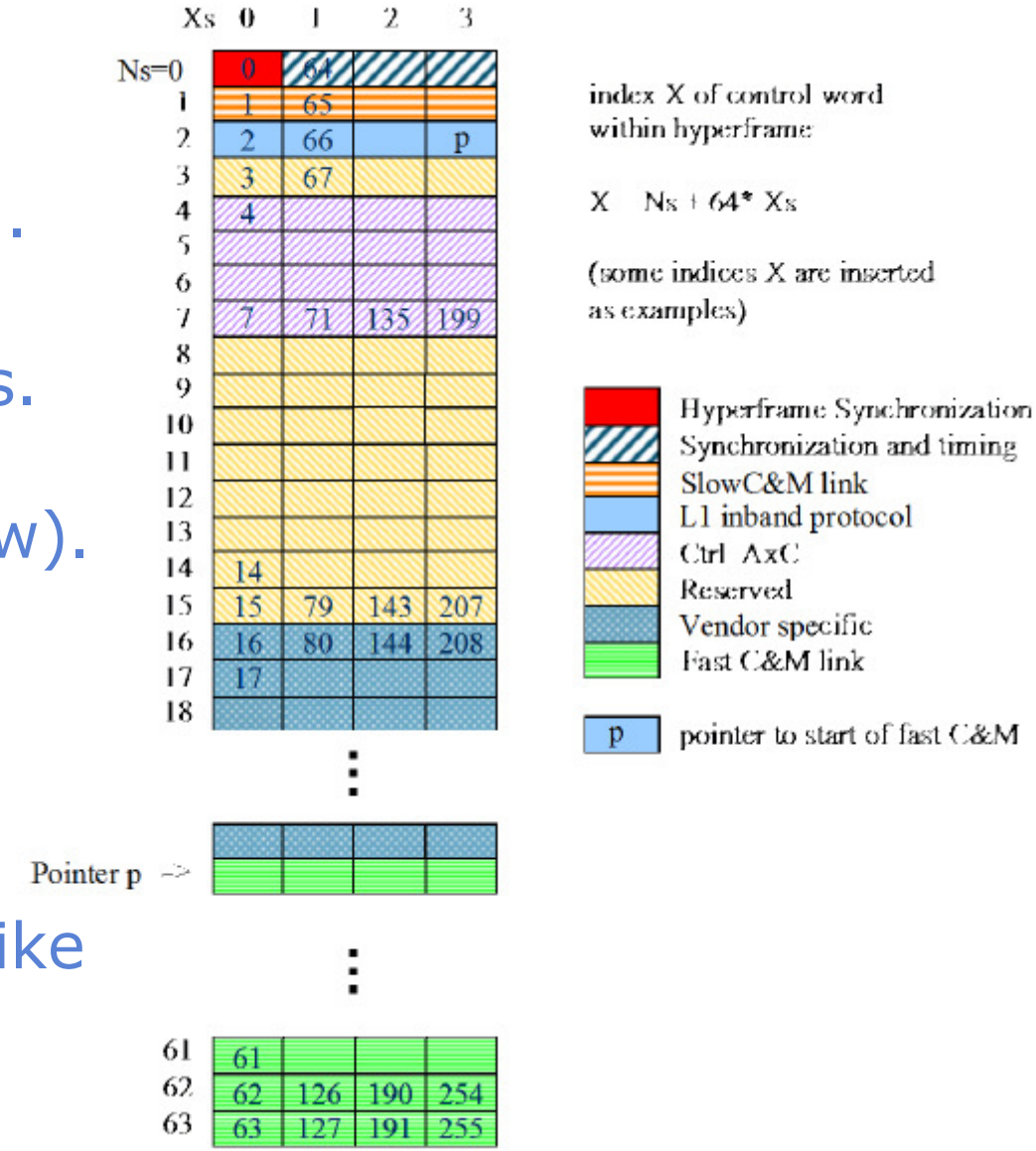
- RoE packets should have the same length.
- The assumption is that a RoE packet with E=1 ends the carried frame and the frame ends at full octet boundary.

The better structure aware mapper

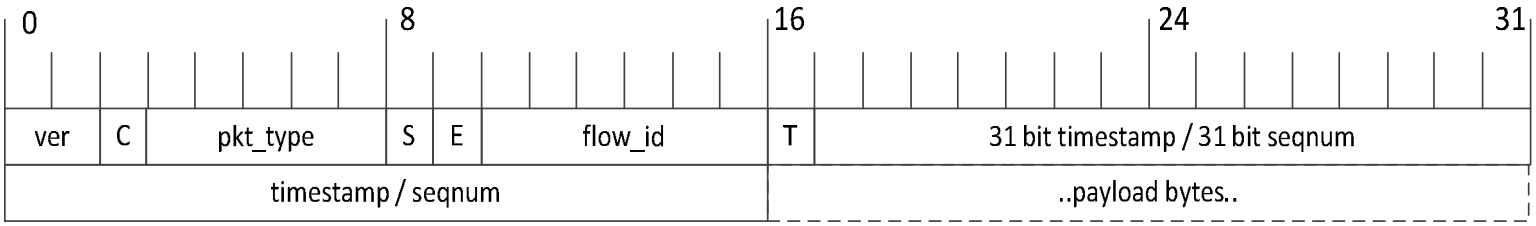
- Map N*Tc worth of Basic Frames into M*RoE packets.
- Each RoE packet carries one AxC but multiple Tc worth of sample data e.g. 8*Tc @20MHz LTE -> 64 samples per RoE packet.
- RoE control packets to carry auxiliary bits.
- Do not send reserved control words or unused data -> less data to send by required some intelligence to interleave it over multiple RoE Control packets.
- Pick up the lowest hanging fruit and define IQ sample based mapping only for one radio technology (LTE) with stuffing bits at the end of the container block..

CPRI mapper and control words..

- Do not send:
  - Sync + timing.
  - L1 inband protocol.
  - Reserved field.
  - -> total 212 words.
  - -> 3392 bytes per 256*Tc (128bits cw).
- Fits easily into available RoE Ctrl bandwidth,
  - unless there is competing traffic like 1588..



The better mapper



- Reserve a pkt_type (say 0x02).
- S&E flags set accordingly.
- flow_id is the CPRI AxC number.
- Either timestamps or seqnums used.
  - In a case of seqnums the increment amount is to be decided during the "link setup".
- Payload is an AxC.
- CPRI control words are transported as a separate RoE control packet stream.
  - Also the optional "extended_header_space" can be used to carry parts of the control data. The content is vendor specific.

AxC encoding for the "better" mapper

- The sample length negotiable during the link setup phase.
- Samples shall not be interleaved.
  - I first then Q.
  - From MSB to LSB.
- Example; 15 bits samples, word size 32 bits (for illustration purposes):

0 0															1 6															3 1
I14	I13	I12	I11	I10	I9	I8	I7	I6	I5	I4	I3	I2	I1	I0	Q14	Q13	Q12	Q11	Q10	Q9	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1	Q0	I14	I13
I12	I11	I10	I9	I8	I7	I6	I5	I4	I3	I2	I1	I0	Q14	Q13	Q12	Q11	Q10	Q9	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1	Q0	I14	I13	I12	I11
I10	I9	...																													

Potential TLVs

- Link setup TLVs – TBD.
  - In addition to CPRI "link setup" also negotiate which subchannels are actually used.
  - Length of the sample.. etc.
- CPRI Control Word content:
  - Sync&timing – only send the timing part.
  - Slow C&M sent as-is (optional)
  - L1 not sent – part of link setup.
  - Ctrl_AxC sent as-is (optional).
  - Vendor specific sent as-is (optional).
  - Fast C&M sent as-is but (optional).
- TLV realization:
  - Separate TLVs for each subchannel -> incurs some encapsulation overhead, unfortunately.
  - Interleave parts of Fast C&M into every possible RoE control packet.