IEEE STANDARDS ASSOCIATION

IEEE P1914.3 64B66B considerations

* Draft for P1914.3/D1.2 TF review comments *

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Background

- Discussion raised on aligning Structure Agnostic Mapper line coding procedures to 64b66b coding as well. Currently 1914.3/D1.2 only describes handling of 8b10b coding.
  - See 1914.3/D1.2 sub-clause 7.1 and 6.8/6.9 (mapper params).

- Issue raised during 1914.3/D1.1 TF review by multiple reviewers. The comments were **withdrawn** in order to have a baseline proposal for the handling of 64b66b coding:
  - See tf3_1608_comments_resolved.pdf and comments #3, 13, 14, 53, 55, and 58.

- http://www.ieee1904.org/3/meeting_archive/2015/10/tf3_1510_closing.pdf
  - During Oct'2015 we agreed to add a tunneling mapper.. See http://www.ieee1904.org/3/meeting_archive/2015/10/tf3_1510_bross_agnostic_1.pdf
  - However, there was no motion on this – just gentlemen's agreement.

Reasoning

- There's still unnecessary overhead from the 64b66b line coding:
  - ~3% is not much but still enough to complicate the transport of (popular) CPRI option 10 using structure agnostic RoE.

- Describing the removal/insertion of 64b66b would align the specification, since 8b10b line coding is already there.

- Structure aware mapper mode has to handle 64b66b line coding anyway, so the required functionality is already there in the mapper.

Some numbers..

Assuming CPRI option 10 (24330.24Mb/s, word size 48 octets).

- One BF is 768 octets w/o 64b66b and 792 octets w/ 64b66b.
- Ethernet overhead 38 octets (preamble, DA/SA, no VLANs, FCS and IPG) + RoE overhead 8 octets -> total 46 octets overhead per RoE packet.
- 1 BF per RoE packet -> even w/o 64b66b won't fit into 25G Ethernet link (25.006Gb/s bw needed).
- 1.5 BF per RoE packet w/ 64b66b -> ~25.27Gb/s.
- 1.5 BF per RoE packet **w/o 64b66b -> ~24.54Gb/s**.
- Why 1.5 BF payload size? Try to keep below 1500 octets..
  - Note: current D1.2 does not support half BFs..

- Summary: CPRI option 10 usable only without 64b66b coding.

RoE with or without 64B66B coding

CPRI 10 rate			
with 66B		24,330.24	Mb/s
without 66B		23,592.96	Mb/s
ENET frame size			
	BF/pkt		
BF with 66B	1	792	bytes
BF w/o 66B	1	768	bytes
BF with 66B	1.5	1188	bytes
BF w/o 66B	1.5	1152	bytes
BF with 66B	2	1584	bytes
BF w/o 66B	2	1536	bytes
ENET properties			
ENET RoE OH		46	bytes
ENET capacity (-100ppm)		24,997.50	Mb/s
Required ENET bandwidth			
	BF/pkt		
BF w 66B	1	25,743.36	Mb/s
BF w/o 66B	1	25,006.08	Mb/s
BF with 66B	1.5	25,272.32	Mb/s
BF w/o 66B	1.5	24,535.04	Mb/s
BF with 66B	2	25,036.80	Mb/s
BF w/o 66B	2	24,299.52	Mb/s

CPRI 100G rate			
with 66B		97,320.96	Mb/s
without 66B		94,371.84	Mb/s
ENET frame size			
	BF/pkt		
BF with 66B	1	3168	bytes
BF w/o 66B	1	3072	bytes
BF with 66B	0.5	1584	bytes
BF w/o 66B	0.5	1536	bytes
BF with 66B	0.375	1188	bytes
BF w/o 66B	0.375	1152	bytes
ENET properties			
ENET RoE OH		46	bytes
ENET capacity (-100ppm)		99,990.00	Mb/s
Required ENET bandwidth			
	BF/pkt		
BF w 66B	1	98,734.08	Mb/s
BF w/o 66B	1	95,784.96	Mb/s
BF with 66B	0.5	100,147.20	Mb/s
BF w/o 66B	0.5	97,198.08	Mb/s
BF with 66B	0.375	101,089.28	Mb/s
BF w/o 66B	0.375	98,140.16	Mb/s

Proposal

Add 64b66b coding **removal** to the Structure Agnostic Mapper.

Changes needed in 1914.3/D1.2:

- Sub-clause 7.1 paragraph b)
  - Add 64b66b text similar to 8b10b removal.
  - Add a mention that FEC is also processed as a part of decoding.
- Sub-clause 7.1.2.3
  - Add required 64b66b text.
- Sub-clause 7.1.2.5
  - Add 64b66b text similar to 8b10b removal.
- Tables 6-4 and 6-5:
  - Rename 8b10 aware mode to e.g., ”agnostic mode”
  - Increase 8b10 aware mode bits from 1 to 2
  - Add .64b66stripMode to 8b10 aware mode (”agnostic mode”)
  - modify packet length mapper type to cover 64b66b and fractional ”BF” sizes. (octet counts for all agnostic mapper)
  - Rename .8b10stripMode to e.g., ”.agnosticMode”.

Discussion

Motion #__

- Agree as a baseline the changes needed for 64b66b line coding removal in structure agnostic mode as listed in page 6 of tf3_1610_korhonen_64b66b_1.pdf.

- Mover: Jouni Korhonen
- Seconder:

- Yes: ___ No: ___ Abstain: ___ (technical motion needs >= 2/3)