800GBASE-LR1 Permutation function

In support of comment #156

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Lane grouping and Permutation functions

184.4.2 Lane grouping

The 32 Inner FEC sublayer interface bit streams might be received in any order. The bit stream number is defined by the unique portion (UM0 to UM5) of the alignment marker that is mapped to each PCS lane (see 172.2.4.6) carried by each bit stream.

The vector pcsla[q, i] represents the Inner FEC flows at the output of the lane grouping function, aligned to 10-bit RS-FEC symbols, where the index i represents the sequence of 10-bit RS-FEC symbols and q the Inner FEC flow number.

The lane grouping function shall organize the 32 bit streams into two groups according to the PCS lane number so that all bit streams with PCS lane numbers 0 to 15 are assigned to one group and all bit streams with PCS lane numbers 16 to 31 to another group. One group is then assigned to pcsla[q, i] for $q = 0$ to 15 and the other is assigned to pcsla[q, i] for $q = 16$ to 31.

184.4.3 Permutation

The lane permutation function shall rearrange the RS-FEC symbols of the pcsla[q, i] Inner FEC flows to create 32 output flows such that each group of four consecutive symbols on each output flow contains one symbol from each of the four RS-FEC encoders in the 800GBASE-R PCS as shown in Figure 184–3.

The permutation function maps the RS-FEC symbols received on 32 pcsla flows to 32 output permo flows.

— Define permo[q, i] to be the 10-bit symbol in output flow q at time i at the output of the permutation function.

The permutation function is defined by the following pseudocode:

For each i
    For each $q = 0$ to 31
        permo[q, i] = pcsla[($q + 16 \times$floor($i/2$)) mod 32, i]
    End for
End for

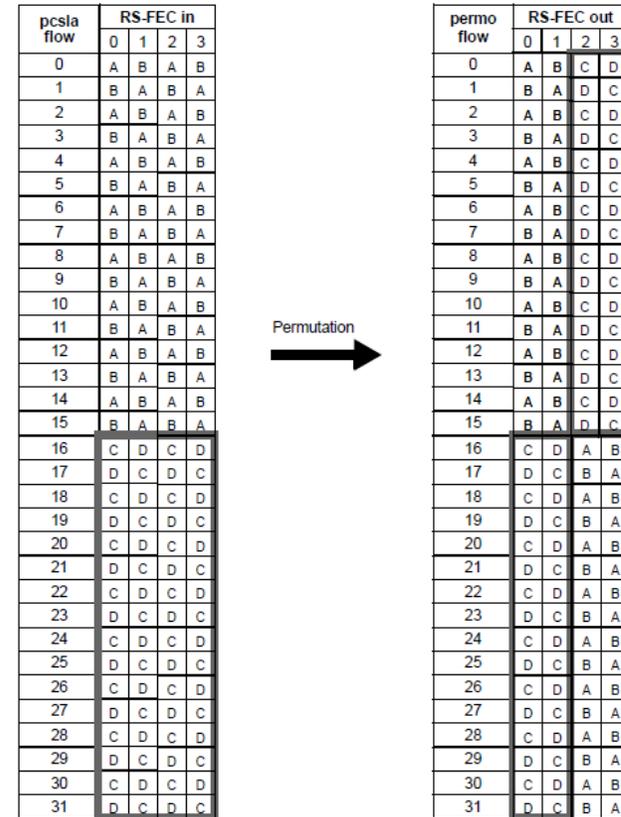Where floor(a) denotes the greatest integer less than or equal to the real number a.
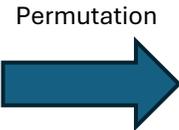

Figure 184–3—Lane permutation

- Figure 184-3 implies that the odd/even PCS lanes are assigned to odd/even pcsla flows
- It also implies that the PCS lanes 0-15 are assigned to pcsla flows 0-15 and the PCS lanes 16-31 to pclsa flows 16-31
- This contradicts the lane grouping definition

Suggested remedies:

Either delete Figure 184-3 and the reference to it, or replace Figure 184-3 and change the text in 184.4.3 as follows:

The lane permutation function shall rearrange the RS-FEC symbols of the pcsla[q, i] Inner FEC flows to create 32 output flows such that each group of four consecutive symbols on each output flow contains one symbol from each of the four RS-FEC encoders in the 800GBASE-R PCS as shown in Figure 184–3.

The lane permutation function shall rearrange the RS-FEC symbols of the pcsla[q, i] Inner FEC flows to create 32 output flows such that each group of four consecutive symbols on each output flow contains one symbol from each of the four RS-FEC encoders in the 800GBASE-R PCS. Figure 184–3 shows an example of the lane permutation function operation.

pcsla flow	RS-FEC in			
	0	1	2	3
0	D	C	D	C
1	D	C	D	C
2	C	D	C	D
3	C	D	C	D
4	C	D	C	D
5	C	D	C	D
6	D	C	D	C
7	C	D	C	D
8	D	C	D	C
9	D	C	D	C
10	D	C	D	C
11	D	C	D	C
12	C	D	C	D
13	C	D	C	D
14	C	D	C	D
15	D	C	D	C
16	A	B	A	B
17	B	A	B	A
18	A	B	A	B
19	A	B	A	B
20	A	B	A	B
21	A	B	A	B
22	A	B	A	B
23	B	A	B	A
24	B	A	B	A
25	B	A	B	A
26	B	A	B	A
27	B	A	B	A
28	B	A	B	A
29	A	B	A	B
30	B	A	B	A
31	A	B	A	B

Permutation →

pcsla flow	RS-FEC in			
	0	1	2	3
0	D	C	A	B
1	D	C	B	A
2	C	D	A	B
3	C	D	A	B
4	C	D	A	B
5	C	D	A	B
6	D	C	A	B
7	C	D	B	A
8	D	C	B	A
9	D	C	B	A
10	D	C	B	A
11	D	C	B	A
12	C	D	B	A
13	C	D	A	B
14	C	D	B	A
15	D	C	A	B
16	A	B	D	C
17	B	A	D	C
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D
21	A	B	C	D
22	A	B	D	C
23	B	A	C	D
24	B	A	D	C
25	B	A	D	C
26	B	A	D	C
27	B	A	D	C
28	B	A	C	D
29	A	B	C	D
30	B	A	C	D
31	A	B	D	C

Figure 184–3—Lane permutation

Backup

Figure 184-3 change from D1.2 to D1.3

- As part of the resolution of comment #422 against D1.2, Figure 184-3 was changed to make it more general.
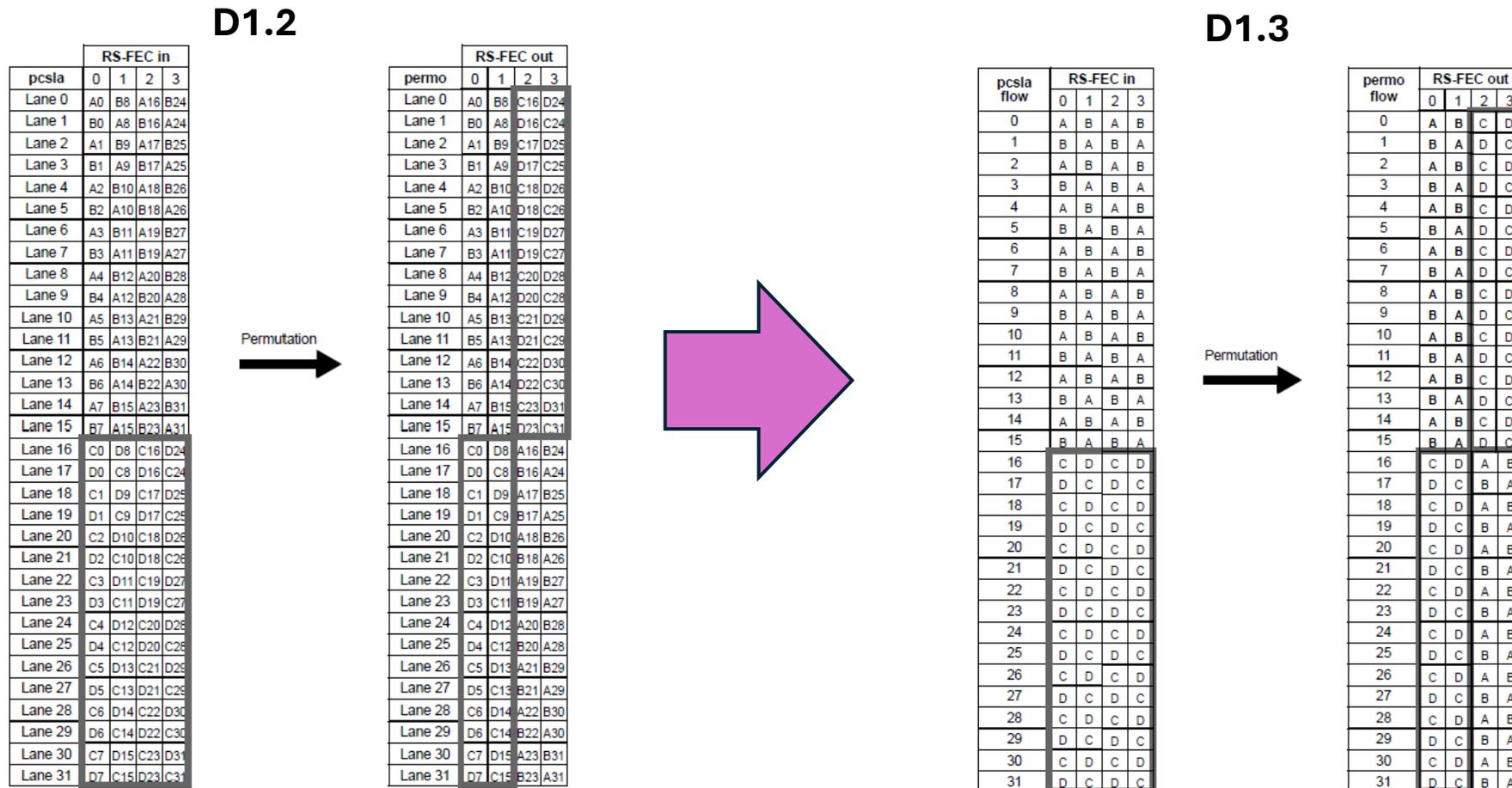

D1.2

D1.3

Figure 184–3—Lane permutation